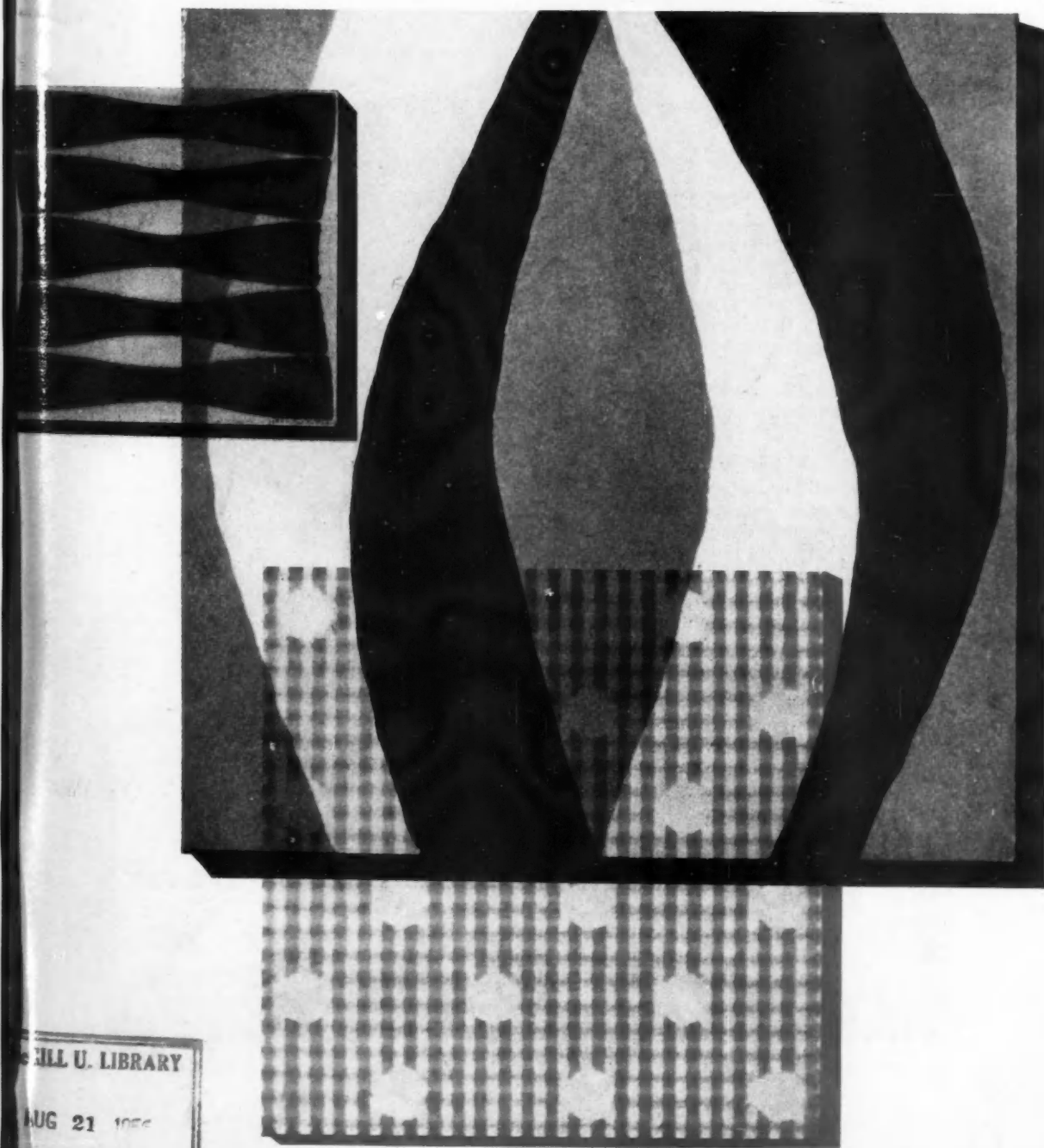


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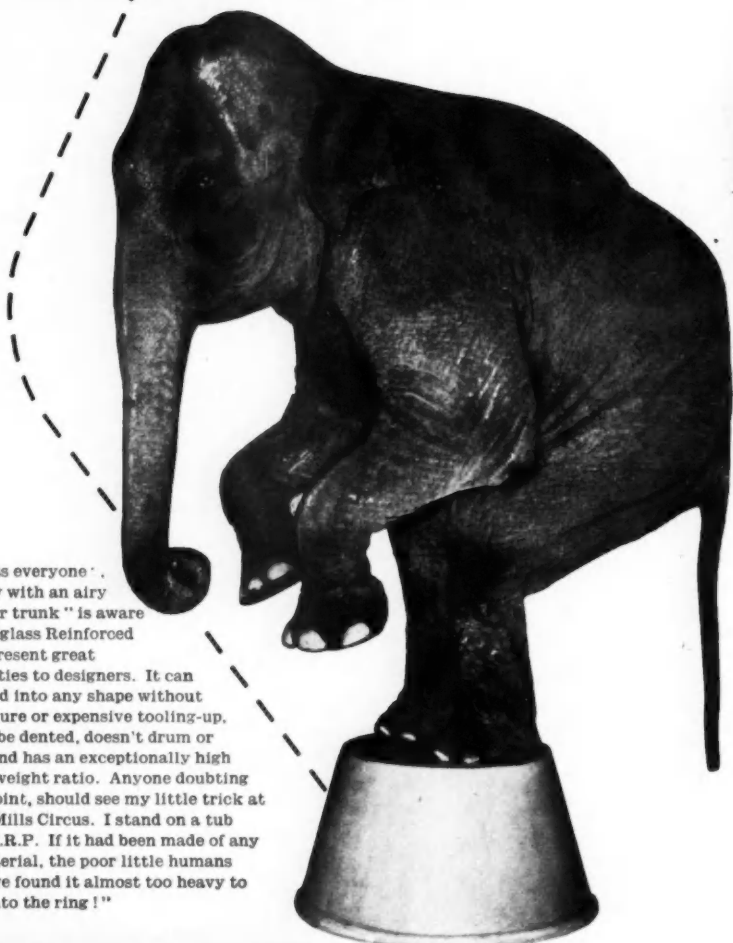


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Design

Number 92 August 1956

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Kenneth Garland

ASSISTANT EDITOR

John E. Blake

EDITORIAL ASSISTANT

Gillian E. Naylor

PRODUCTION

Aubrey Hewitt

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Dennis Hooker

BUSINESS MANAGER

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EDITORIAL

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a free service of recommendation

and introduction of designers

to industry

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Ready for discussion

The boardroom of the Federation of Master Process Engravers was designed and furnished by us in collaboration with the architects Messrs. Scott and Westmorland. The furniture and panelling is of French walnut. The charcoal grey carpet contrasts with the persimmon curtains. Natural hide was used to cover the chairs.

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Souvenirs of Summer

BEFORE THIS SUMMER ENDS many hundreds of thousands of visitors from home and abroad will have paid their halfcrowns to see the great houses of Britain, those masterpieces of architectural manners from which have stemmed so many of our traditions and so much of our reputation for design. The British public, eager and curious as ever to know more of other people's lives, will none the less have seen and absorbed beauties beyond its ken and reach, and will have returned home the richer for them.

Some visitors may also take home a souvenir, at best a well printed booklet or a hand thrown pot or even a bunch of flowers cut from a noble garden, but at worst what? The very word souvenir suggests the worst and so measures the bathos and futility of most objects offered as mementoes of holiday visits to places of beauty.

We are not alone in this peddling of the worthless to the witless. The departure halls of the world's airports are littered with trivial reminders of national monuments and sentiments, cynically devised to extract the small change from the traveller's pocket at the moment when sales resistance is at its lowest ebb. Only in a few, in Scandinavia for instance, do the kiosks offer anything worth keeping, however whimsical and folksy that may be.

The gift trade comprises many hundreds of firms, many different and varied industries, many crafts and many materials, but, it would seem from a cursory glance at the average gift shop, only one level of design and that the lowest. There are exceptions of course and there are enlightened voices in the trade seeking to raise the standards, but progress must be slow until the public itself demands better things. How is this to come about? The simple answer is to show a choice between good and better not bad and worse, for, as The Design Centre has proved, there is a keen public for good design.

But who will take the first step? Here, surely, opportunity matches duty for those noble families and public spirited bodies who open their houses to the multitude. If the Peers of the Realm and the National Trust were to commission first class souvenirs from competent designers and craftsmen and then sell them at the gate, they would not only help themselves but might in time set such a standard that the manufacturers who cater for the larger masses at the seaside would themselves take note. Eventually, too, our airports might become selective in what they exhibit to the traveller as examples of British taste and quality.

Pointers

My only criticism is that the display is rather haphazard, and therefore tends to combine the worst features of an exhibition and a museum. However, the layout of 'Design Review' is admirable, and the exhibits are eminently worth showing.

S. P. MORSE
Manager, Furnishing Dept
Tootal Broadhurst Lee Co Ltd
56 Oxford St, Manchester 1

More modern

SIR: The opening of The Design Centre will be welcomed by all design conscious retailers and manufacturers. The presentation is stimulating and the problem of displaying a wide variety of merchandise in such a concentrated area has been most cleverly overcome.

Prior to opening a new china and glass department at Woollands in the autumn, specialising in the best modern designs, we have made considerable use of 'Design Review'. While this has been a useful guide to the 'handwriting' of certain manufacturers, it is rather horrifying to find not only examples of good new designs but catalogues of whole ranges, including old patterns that have been running for years. Surely one of the most important aims of The Design Centre and 'Design Review' is to present a picture of the best designs of today, and not the best sellers of yesterday.

M. G. MOSS
Managing Director
Woolland Bros Ltd
Knightsbridge SW1

Modern plus traditional

SIR: Behind the scenes The Design Centre must have already done a very considerable amount of good. For the realisation that one's products are displayed side by side with those of competitors - for all the world to see - is an added spur to greater effort.

There is, nevertheless, one point I should like to raise which may, perhaps, come better from one who is primarily interested in contemporary trends rather than from those who specialise in other fields. It is simply this: good design is surely not confined to the contemporary idiom alone? Should there not be space at the Centre for a representative display of some of the delightful chintz and other traditional designs which I see from time to time on my travels, and for which the existing considerable demand is eminently justified? And, if the accent is only to

be on contemporary, is not the present designation - The Design Centre - a misnomer?

FRANK H. STOCKWELL
Managing Director
S. J. Stockwell & Co (Carpets) Ltd
16 Grafton Street
London W1

Aid to export

SIR: The lighting industry in this country is one which should be encouraged in every possible way; compared with Continental manufacturers we are almost pathetically small as an industry. In my opinion it is possible to increase the exports of lighting fittings from the United Kingdom by ten to fifteen million pounds per annum, if our home market can be made more lighting conscious and so enable larger scale production at reduced prices. I am certain that The Design Centre could be made into one of our most successful export aids, provided that buyers can be made to understand that they would be able to find the cream of British production at the Centre, covering a very wide range of merchandise. I would suggest also a well appointed lounge where export buyers could meet manufacturers' representatives by prior appointment.

R. C. HISCOCK
Managing Director
Hiscock, Appleby & Co Ltd
2 Cadogan Place, Sloane St, SW1

Include the Provinces

SIR: Within the limited point of view of a manufacturer supplying metal tableware, you may be interested in the reactions which we have noted to our exhibits in The Design Centre.

We view the Centre as an extension of the departmental stores and shops; the appeal has been essentially to the public, and, our traditional outlets, namely the jeweller and silversmith, and the hotel and restaurant trade have not passed comment. It is early days to make an appreciation, but we can say that several London stores have added a pattern of flatware to their range through public acceptance of it at the Centre.

We feel that what is now wanted is a smaller version of the Centre as a permanent feature housed in co-operation with the departmental stores in the Provinces and suburbs, thereby procuring national acceptance.

E. G. PATON
Elkington & Co Ltd, Walsall



Our readers are sending in comments on The Design Centre; we publish five of them on this page. Apart from the interest created at home, the Centre is becoming known abroad. In Sweden an exhibition, arranged by Svenska Slöjdföreningen to include 200 items from the Centre, was highly praised by King Gustav, seen above with Sir Gordon Russell, left, director, CoID, inspecting some of the exhibits.

Public demand

SIR: The opening of The Design Centre gives manufacturers a chance, at last, of showing the public the best they can produce, without the intermediate operation of having to convince the retail buyer that the goods will sell.

One of the most gratifying results for us has been the interest shown by the general public - as shown by enquiry post cards - in the fabrics we have displayed. In one case we have brought forward by six months the issue to the home market of some rather advanced designs, mainly because of the interest displayed in the example shown, which was only offered to overseas markets.

cars

The appearance of motor cars interests everybody. Designs are discussed hotly by those who would not look twice at a building, a chair or a kitchen sink. But how much serious thought is given to the subject by people who make cars in this country? Answers are given to this question in three articles, beginning here, which discuss British car design and suggest that leadership rests with one firm.

Designing for world markets

GORDON WILKINS

Motoring Correspondent, 'The Observer'

FOR THE FIRST TIME since the war, the British motor industry can make more cars than it can sell. It is still making an immense contribution to the nation's balance of payments, but it has been overtaken by Germany as the world's greatest car exporter, and its share of some important foreign markets has been declining steadily. Uninspired appearance, and lack of attention to details of finish and equipment have been cited among the factors slowing down the British advance. Where do we stand in relation to our competitors?

The car is a product in which art and engineering are both deeply involved, but as the public now takes performance and reliability very much for granted, appearance and equipment increasingly affect sales. There is still in some quarters a tendency to regard appearance as something applied after the engineers have designed the car, whereas the trained industrial designer (in the motor industry known as the 'stylist'), fully informed on the economics and techniques of production, should have his share in its evolution from the moment the project is authorised. He should have authority to maintain his point of view, with directors, engineers and suppliers of equipment, for it is his contribution which decides whether the vital first impression made by the car on the public will be good, bad or merely negative. By this criterion, some cars are not really designed at all. Shoddy heater controls, old fashioned steering wheels, control knobs in assorted shapes and colours, flimsy pull-out handbrakes, inconvenient door handles, inadequate latches on ventilating panes, ugly lamps, and unimaginative hub caps on the wheels, proclaim themselves as stock items bought off the peg.

There are some good designers, working with good equipment in congenial and stimulating surroundings, but at least one of Britain's biggest manufacturers has no styling studio. Bodies which will involve a tooling investment of half a million pounds are evolved by the body engineer in conjunction with a draughtsman who is reputed to have an

Designing for world markets

eye for line. From their drawings emerges a mock-up which is modified by the directors according to their own personal ideas. Designs evolved by such casual methods are not merely obsolescent by the time they are put on the market, but are unlikely to show a true understanding of the problems involved. The subject is far too important and too complex to be treated as a sideline by people primarily occupied with engineering questions.

Planning for the future

In the ten years since the war, car appearance has changed more than in the previous twenty. In America, it was probably Raymond Loewy's Studebaker saloon of 1946 with its crisp, angular line, and panels shaped to give clear highlights without excessive use of chromium, which really established the post-war trend. In Europe, Pinin Farina's Cisitalia coupe was one of the most valuable pointers in showing how to handle the new flush-sided style, without separate wings or running boards. From then on, it became virtually impossible to establish a good body shape on the basis of three-view engineering drawings; it had to be conceived in perspective sketches and models.

America's 'Big Three' (General Motors, Ford and Chrysler) have evolved an elaborate and costly technique to take the guesswork out of styling. Apart from hundreds of designers and engineers engaged on current products, they maintain long-range study groups to investigate new ideas, and establish the lines of future evolution. It is now almost impossible for a small American manufacturer to break away from the established style. When Raymond Loewy tried to create a new trend with his Studebaker coupe of 1953, one of the few really beautiful cars to come out of the United States, it was quickly loaded with irrelevant decoration, and finally replaced by something square, aggressive and pretentious; something "within the design trends of the industry" as the 'hand-out' said.

Detroit-Turin collaboration

Currency problems prevent any great export of American cars, but General Motors and Ford are able to extend the influence of American design throughout the world via their subsidiary companies in England, Germany and Australia, whose designers regularly visit Detroit to keep informed on long range trends.

While thus advancing on a broad international front, the Americans protect themselves from surprises by

close contact with the sources of European inspiration. Young Italian designers are recruited to work in Detroit, and design contracts with leading houses such as Ghia and Pinin Farina ensure a steady interchange of ideas. The trend of world automobile fashion is thus largely established along a Detroit-Turin axis, and other countries are steadily being brought under its influence. France's Peugeot 203 was styled by Pinin Farina, Volkswagen went to Ghia for its elegant two-seater coupe, and at least one of Britain's leading manufacturers is now consulting Italian designers.

It is through sports cars that Britain has had the greatest influence on post-war style. MG, Jaguar and Austin-Healey awakened Americans to the idea that motoring could be fun, and Detroit manufacturers cashed in on the glamour attached to the sports car, both by building sporty roadsters of their own, and by using design clichés such as the dip in the waistline of the Jaguar, which is reflected in the current Chevrolet.

So far, there has been little design for obsolescence outside the United States, as tooling costs prevent frequent model changes. Indeed, manufacturers might do more, by changes of grilles, wings and other parts, to maintain the evolution of established models, and a clearer understanding of future trends would help them to provide for such changes during the original design stage. Rootes has applied this technique successfully.

Modern trends in Europe

In the top price class everywhere in the world changes are infrequent, both to protect the buyer's investment, and to keep tool amortization down to a reasonable figure per unit. Rolls Royce and Bentley have gracefully achieved the transition to the flush-sided style without loss of character, but British custom coach-builders have failed to seize their opportunities, perhaps because of the discouraging effects of purchase tax. The best contemporary expression of the elegant hard-edged style in which Britain used to lead, is now to be found in Pinin Farina's 'Florida' saloon, and his recent saloon body for the Fiat 1100.

Among the low-priced European cars, the Volkswagen has achieved the greatest success, while standing apart from all changes of fashion, though its ascendancy is now challenged by the small British and German Fords, and the Opels. The Fiat 600 and the Renault 'Dauphine' offer new solutions to the problems posed by the rear engine car, and the Borgward 'Isabella' is graceful and well proportioned.

In the middle range of British cars a good deal of money has been sunk in ugly bodies which in the Continental phrase, "do not conform with the aspirations of the clientele". One particular £100,000 misfire

comes to mind; it was conceived by a designer who rarely leaves his own district, and then modified to suit the views of directors and British agents, but it never seems to have come under the influence of anyone who was closely in touch with modern trends, or able to interpret them.

The challenge of new ideas

Loewy once defined the kernel of the problem as one of selecting from a series of designs the mystic MAYA – the Most Advanced, Yet Acceptable – but a designer who is tied to his drawing board cannot get within sight of the creature. It is a striking fact that the most popular British built cars in free international markets like Belgium and Switzerland are now Fords, and good design must have a measure of the credit. There is however, scope for diversity of style outside the United States, and Citroen has shown that it is possible to produce an original if not entirely successful design which owes nothing to American influence. There is also room for new types of vehicle. Since the war, the Volkswagen 'Microbus' and 'Transporter', the Fiat 'Multipla' and the Isetta have broken away from established formulae to bring users unique advantages. The possibilities are not yet exhausted, but so far there is little evidence that the British industry is prepared to meet this design challenge.

Comparative sales for some British cars in Belgium (a typical free market) during the first 10 months of 1955:

Ford	all models	4,647
Vauxhall	„ „	1,767
Austin	„ „	1,027
Morris	„ „	883
Hillman	„ „	678

In 1953 British sales to Belgium were 15 per cent of the market and about half those from Germany.

In Switzerland (another free market) Britain's share of sales declined from 24 per cent in 1952 to 11 per cent in 1955.

During this period Germany's sales increased from 41 per cent of the market in 1952 to 49 per cent in 1955.



The postwar trend in car design has evolved from these two revolutionary designs from Italy and America. Produced in 1946, both show the use of the new slab-sided form with strong emphasis on the low horizontal line with a clear break between the main body mass and the canopy above. Top, Cisitelia coupe designed by Pinin Farina. Above, Studebaker saloon designed by Raymond Loewy.

Product of Detroit-Turin collaboration. The Ghia 'Dart' on an experimental Chrysler chassis, with fuel injection engine, and torsion bar suspension. The body, studied first in model form in a wind tunnel in Turin, features sharp edged tail fins, and combination of frontal air intake with the bumper.



cars

Refinement in three stages

Ford cars since 1951

JOHN E. BLAKE

On the following pages we are concerned with the development of the basic form of the three Ford ranges produced since 1951. Only one car from each of the ranges is therefore discussed, except where variations of detail in an individual model have had a significant effect on its general appearance.

FROM THE POST WAR PANORAMA of mass produced British motor cars, one company stands out firmly – stands out as an exception to a depressing rule, and in defiance of an approach to car styling which apparently accepts as an acme of perfection the sucked sweet, or the melting ice cream. The company is Ford, and its development since 1951 is a copy book example of principles conceived and applied by trained industrial designers.

It must be recognised that the current form for the mass produced saloon car has been established since Loewy's 1946 Studebaker. Simply, this form consists of a rectangular box on wheels, divided into three compartments for engine, passengers and luggage, and with a glazed canopy above: a sensible form. But to fulfil adequately all its requirements, this form must be modified. The *manner* in which it is modified is all important.

The 1951 'Consul' was the first attempt by the British motor industry to introduce a car based entirely on this box-like configuration. Its effect at the time was revolutionary. Yet in spite of its advanced conception, this car appears today a trifle old fashioned, slightly awkward in proportion, a little too soft in contour. Taste has changed, but it has changed only because experienced designers have been able to refine and improve the initial idea. Thus the 1953 'Anglia' and 'Prefect' show subtleties of body design not present in the older cars. The latest 'Consul', 'Zephyr' and 'Zodiac' reveal still further improvements which result from a logical evolution towards a given objective.

The objective, as in nearly all cars today, is the long low line to express speed – a difficult problem in a car with a short wheel base. In small cars like the 'Anglia', it can only be achieved by a careful disposition of the main masses and by a controlled handling of those details which disguise or exaggerate the desired effect – panel joints, trim and hard, defining contours. In most small British cars, however, and in many larger ones, the evocative low shape is lost by a failure to appreciate the importance of these visual factors.

But though Ford cars remain in the forefront of British automobile design, they merely embody principles which had already been discovered and developed in America. In this respect the Ford Motor Co has a significant advantage over all but one of its British competitors, for relationships between the British company and its American parent are close. Appearance design is largely an evolutionary process in which experiment plays a considerable part. Many of the American Ford stylists (there are about 600 compared with 30 in this country, including modellers) are concerned with imaginary future projects which represent serious design research, and British Ford stylists can draw on this vast fund of accumulating knowledge.

The motor industry has been more dependant on styling than almost any other. Ford's policy in recognising its importance is apparent in its studio, which has gradually moved away from its early dependance on the American company, and is now possibly the largest in the country. But the policy extends further and can be seen in the projects for its new industrial buildings at Aveley and Basildon, where modern architecture is seen as a logical extension of modern production methods. Nowhere, however, is it more significant than in the products themselves. Three major stages in the development of these cars are set out and analysed on the following pages.

Zephyr
Anglia
Consul

Consul
Prefect
Zodiac



'51

'53

'56

Consul
Zephyr
'51

The first British car conceived entirely as a long box with a canopy above. Major departures were the unbroken waist line, flush side, long boot to balance front end, horizontal grille, clearly defined corners. The box however is high and appears too narrow from the end or three-quarter views. Window pillars are thick and the car has been smoothed off giving soft contours. The design was a co-operative effort with considerable American guidance.



Prefect
Anglia
'53

The rectangular box refined to produce a more satisfying proportion on a car which is considerably smaller. The height of this box has been lowered in relation to its length and width, and the canopy raised to give sufficient head clearance. The canopy is lighter with narrower pillars allowing the eye to judge proportion from the more dominant base. A co-operative design but carried out mostly by British stylists.



Consul
Zephyr
Zodiac
'56

The proportion of the box is even lower but here the problem was eased by the fact that the car is larger. Corners are pushed out to their limit giving sharp definition to the extremities and exaggerating width and length. Body panels are more subtle in section and have hard crease lines along the tops of wings giving a firm assurance to the shape. The clear sweep of the waist line expresses speed and smooth riding. Designed by Ford stylists under Colin Neall.



Without the help of the horizontal grille the height and narrowness of the box are more apparent from this view. The eye reads the height from the bumper to the lower edge of the rear window which is set rather high in the roof panel. The bumper has been raised above normal height in an effort to counteract this effect. Some help to the proportion has been created by the placing of the boot panel's lower edge.



Considerable progress was made here in the treatment of the rear end. Though the rear window is still high the sharp junction between roof and body, some inches below, gives a more obvious definition of the boot height. Perhaps more important are the rear lights which clearly establish the corners and their height from the bumper. Great care has been exercised in the treatment of the boot panel joint which now becomes a decorative feature.



The lower edge of the rear window has been lowered to coincide with the junction of roof and body giving far stronger definition of the boot height than previously. The rear window has been widened which in turn exaggerates the width of the whole car and flatters its proportions. The treatment of the boot panel again shows great subtlety though is spoiled by over ornamentation in the more expensive 'Zodiac'.



Consul
Zephyr
'51



Prefect
Anglia
'53



Consul
Zephyr
Zodiac
'56



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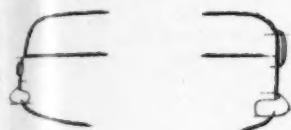
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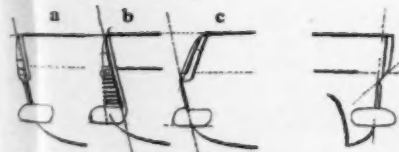
The profile of front and rear ends contributes much to the character of the complete design. Here the downward curve of the front and rear wings to the low set head and tail lights suggests a slightly blown up and therefore cumbersome form. Also the side trim, though essential to reduce apparent height, is too low to be fully effective. Coming close to the front wheel arch it leaves an uncomfortably large area above. At the rear it creates doubt and becomes an irritating 'problem'.



Head and tail lights are raised to the corners giving an uninterrupted sweep from front to rear but retaining sufficient curve to avoid an appearance of sag. The side trim (also a crease to give added strength) is here placed higher on the side panels and relates more comfortably to the wheel arches. To reconcile a low body with a high canopy and yet avoid badly proportioned windows, the base of the windows is set slightly above the waist line.



Front and rear ends are pulled out to increase length and exaggerate the low proportions. On the 'Consul' c, the rear wing pressing is cut back but is given its full length on the 'Zephyr', a, and 'Zodiac', b. This allows useful scope for variation but heavy ornament spoils the more expensive 'Zodiac'. Side trim is again well placed, but because of the semi wrap round windscreen the front pillar is moved back and the lower edge of the windows has once more to be raised to avoid squat proportions. The strong line of the roof gutter adds a further horizontal emphasis.



The treatment of front ends can be valuable in giving scope for variations on a basic model. But as in so many similar cases the cheaper 'Consul', 1, has the most satisfying composition. The simple horizontal grille is logical for this car form and does much to lower the apparent height of the bonnet. The more expensive and powerful 'Zephyr', 2, has been given a more complex grille. The raised centre section suggests a throwback to traditional grille treatments and is a compromise solution requiring more skill in execution. It is less successful than the 'Consul' grille in reducing the apparent height of the bonnet.



Changes in the treatment of grilles are confined here to the use of pattern and texture within the same basic shape. Both are successful and prove that exaggerated variations to distinguish between two versions of the same car are unnecessary. Yet the combination of a satin finish and polished chrome on the 'Prefect' grille, 3, with its slightly more delicate pattern of bars, creates a rich effect which leaves no doubt as to which is the more expensive car. Carefully marked out panel joints, a slight crease in the centre of bonnet and wings, and the placing of lamps and name plates all combine to produce a satisfying composition, slightly spoilt on the 'Anglia', 4, by the 'extra' spot lamp.



As in the 1951 range the new 'Consul', 5, has a more subtle and effective front end than the more expensive 'Zephyr' and 'Zodiac', 6. Exaggerated decorative treatment is unnecessary on a form which is as stimulating as in these cars. Lowness and width are achieved by the use of a high bumper, by the low flat grille and by refined contours of the body panels. The excessive width of the 'Zodiac' grille, the addition of overriders, and the raised centre section (again suggesting a throwback to traditional treatments) are less related to the simple underlying form, and result in a restless composition.



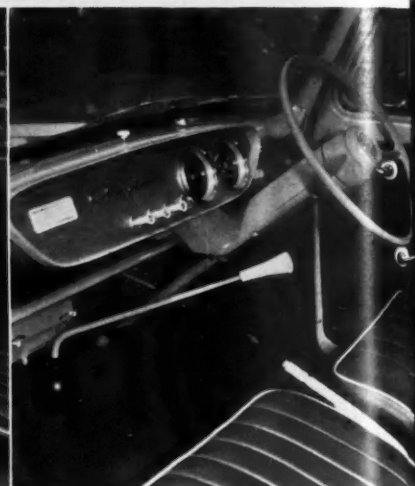
Consul
Zephyr
'51

Facia panels again show how in the later models skill and experience have produced refinements of a basically simple and sensible arrangement. In the past the desire for symmetry often resulted in some dials which could not be seen from the driving position. Here functional requirements have dictated a new conception with dials grouped round the steering column. But the execution suffers from soft, lazy contours giving an appearance of bulkiness which seems to have been carried to an extreme in the casing round the steering column.



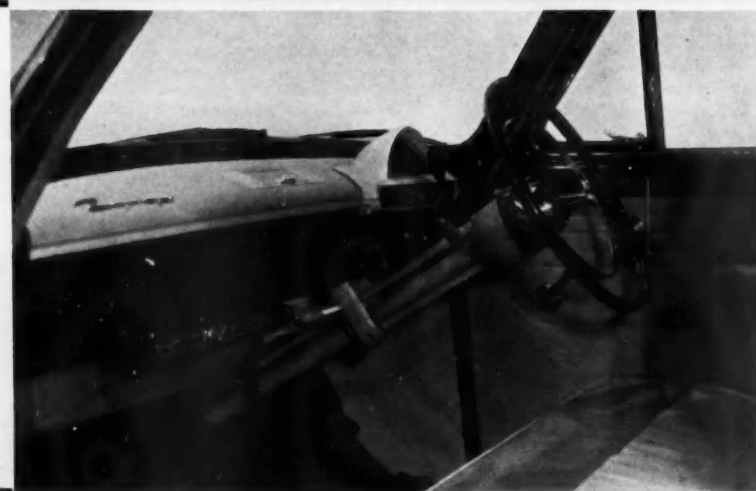
Prefect
Anglia
'53

The facia on the standard version of the 'Anglia' and 'Prefect', left, shows a simplified version of the principle used on the earlier 'Consul'. On the de luxe versions, right, a more conventional panel is used to provide decorative interest and to cover the large, and to some people, ugly glove tray opening. The casing round the steering column gives importance to the wheel, but is sufficiently refined to avoid a bulky appearance. Functionally the standard version is possibly preferable though the treatment in both cases is skillful and pleasing.



Consul
Zephyr
Zodiac
'56

The latest cars show a firm preference for the instrument unit placed over the steering column. Here the treatment has been further refined so that the utilitarian look of the standard 'Anglia' and the bulkiness of the earlier 'Consul', have been avoided. At the same time the dials have been set as far back from the driver, and as near to his normal angle of vision, as possible so that the eye is less tired by rapid changes of focus when looking from the road to the instruments. The treatment of the steering wheel and column, however, lacks the simplicity of the de luxe 'Anglia' and 'Prefect'.



cars

Human basis for design

W. F. FLOYD

The author, a physiologist and member of the Ergonomics Research Society, discusses the design of cars from the point of view of matching the car to the driver, taking the latest Ford range as an example.

The illustration shows the Ford manikin on the drawing board, being fitted into the passenger seat. Note how the foot rest fits the shape of the manikin.

IN DESIGNING its 1956 range of cars the Ford Motor Co Ltd has made use of anatomical measurements in an endeavour to match the vehicle to the driver as closely as possible. The dimensions incorporated in the mechanical design are based upon a large group of American men. A jointed template, in the shape of a man, is used on the drawing board, and represents a man 5 ft 10½ inches high and weighing 165 lbs; these are the average measurements of about 70,000 recruits in the American Army.

American men are not much different from the male population in this country, but there are small and significant differences in height and weight. The best available figures for the male population in Great Britain are: height, 5 ft 8½ inches (wearing shoes, average heel 1 inch); weight, 153 lbs (including indoor clothing). The American figures do not include shoes and thus the dimensions of the new Ford vehicles are centered around a population of men taller than those in this country.

Variability in height, and in corresponding leg and arm measurements, is allowed for by seat adjustment, which is 5 inches from back to front. Thus, a range of sizes is catered for, although the very short man and many women may find some difficulty in leg and arm reaches.

The clutch pedal pressures on the 'Zephyr' were found to be 45 lb for full depression and 15 lb at the engaging position. These figures are within a reasonable physiological range. The accelerator pedal is very light, operating around 1-2 lb pressure for 30-40 mph. The accelerator pedal action, while smoothly graduated at higher engine revolutions, seemed much less smooth at the beginning of its travel. Has any motor car manufacturer ever determined the optimum relationship between accelerator pedal travel and vehicle control, by taking into account the foot movement required and the resulting sensory impressions of the driver?

The use of manikins on the drawing board is a considerable step forward from the trial and error procedures of earlier days. Commendable though it is, it fails to give the designer any indication of the dynamic characteristics of human beings. The postures in which the



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manikins can be placed are in any event unnatural and a manikin does not 'adapt' itself in the way human beings do. The manikin being a two dimensional figure, the method gives only a rough approximation of measurements in the plane of the drawing board. Perhaps the next step is to use three-dimensional manikins in a mock-up.

Even better is the experimental approach which Morant has described as "the method of experimental trials". The essentials are that a suitably chosen group of people act as subjects in the trials. The group contains larger proportions of particularly small and particularly large people than a random sample normally gives. A mock-up of the working space, eg the driving seat of the motor car, is set up so that each subject is able to perform the required movements; the best possible arrangements for each subject are made, with due regard to normal driving conditions. For studying motor car design it is obviously necessary that the mock-up shall be a real motor car which can be taken on to the road, as no laboratory mock-up can properly simulate road conditions to the extent required for such a study. It is possibly more expensive to design a car this way than by using a manikin on a drawing board, but the end product is likely to be safer and better, as the aircraft industry has discovered.

The general problem of designing a motor car so as to match human capacities and limitations is of growing importance in relation to road safety and the efficiency of vehicle control. The scope of the problem is much wider than the mere dimensioning of a vehicle in accordance with anatomical measurements. The mechanical design of a road vehicle should be such that all the actions and manoeuvres demanded from the driver can be achieved accurately; quickly and with safety. The field of view must be adequate, the controls accessible and capable of operation within the physical powers of the individuals who will drive the vehicle. Proper account must be taken of the natural or acquired tendencies of people to do things more readily in one way rather than another; for example, the right-handed way of doing things. This biological approach to problems of engineering design, based on the idea of matching the design of the machine to the anatomical, physiological and psychological characteristics of the human operator, known in America as *human engineering* is termed *ergonomics* in this country.

The great variability in dimensions of the human body from one person to another means, for example, that the position, shape and size of a control such as the steering wheel will have to be a compromise to enable a

large proportion of potential users to obtain reasonable efficiency in control rather than to provide perfection for a few. Only a small number of drivers can expect to 'fit' perfectly into any particular vehicle, but a reasonable compromise to suit a large proportion of the population is attainable.

Next, the driving task itself must be studied. Accurate information is required to show what the task consists of: how does the driver use the controls usually provided; what control manoeuvres are carried out most frequently; how does driving efficiency vary with field of view, posture and seat design; how is steering affected by steering ratio and torque required? Many such questions must be answered. It is necessary to know what forces can be exerted naturally in the operation of controls; for example, pedal or hand grip pressures. Some of these questions do not relate to car driving specifically but give information as to the patterns of behaviour which can best be fitted into the driving task. An example will illustrate the significance of this sort of information. Some vehicles have a 'heavy' clutch, that is to say the pressure required to depress the clutch pedal is considerable. This may mean that, with the limitation of driving position often found, some drivers may not be able to adopt a posture from which it is possible to exert with safety the force necessary to depress the clutch fully.

During the last war, problems of this sort assumed great importance in relation to aircraft cockpit design, and much research effort was expended, both in this country and in America, on designing aircraft which could be flown and fought with maximum efficiency and safety. Progress in motor vehicle design along similar lines has been much slower. Studies of the kind outlined have been carried out during the past decade mainly in America, especially at the Harvard School of Public Health by Dr Ross McFarland and his colleagues. Relatively little 'human factor' research on road vehicle design has been carried out in this country.

For reference

- W. F. Floyd, 'Some Physiological Considerations Which Should Influence Road Vehicle Design, with Special Reference to Problems of Driving', and R. A. McFarland, 'Human Limitations and Vehicle Design': papers presented at the Ergonomics Research Society symposium on 'Human Factors in Road Transport', April 1956.
- R. A. McFarland, J. W. Dunlap, W. A. Hall and A. L. Moseley, 'Human Factors in the Design of Highway Transport Equipment', Harvard School of Public Health, USA, 1953.
- R. A. McFarland, A. Damon, H. W. Stoudt, A. L. Moseley, J. W. Dunlap and W. A. Hall, 'Human Body Size and Capabilities in the Design and Operation of Vehicular Equipment', Harvard School of Public Health, USA, 1953.
- R. A. McFarland and A. L. Moseley, 'Human Factors in Highway Transport Safety', Harvard School of Public Health, USA, 1954.
- G. M. Morant, 'Body size and Work Spaces', Ergonomics Research Society Proceedings, Vol II - symposium on 'Human Factors in Equipment Design', edited by W. F. Floyd and A. T. Welford. Lewis, London, 1954.

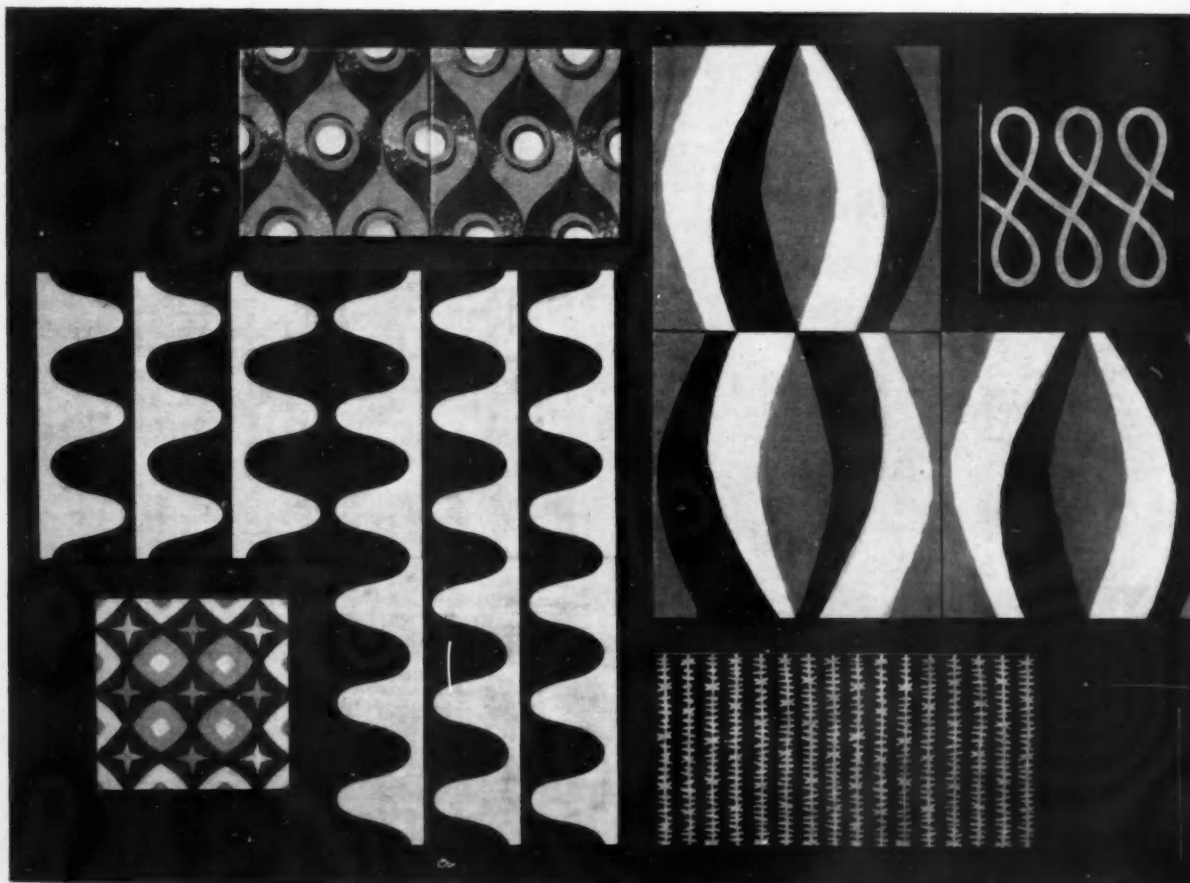
opportunities with **TILES**

MARK HARTLAND THOMAS

Three years ago the author described the "exciting possibilities of the pattern making tile". There has been sufficient progress since then to enable him to confine his second report to this type of tile and to suggest developments that may be possible within this range.

x This group of pattern making tiles shows the wide variety of scale and character that can be obtained, but the number of pattern ways with this sort of design is limited.

DESIGNERS top left, bottom left and top right, A. B. Read; centre left, Peggy Angus; centre right, Gordon Cullen; bottom right, The Nicholson Brothers. MAKER Carter & Co Ltd.



FOR MY PREVIOUS ARTICLE (DESIGN August 1953 pages 19-29) I collected examples of decorated tiles under four headings - tile pictures, picture tiles, patterned tiles and tile patterns. These last two categories, especially tile patterns derived from pattern making tiles, still provide the most interesting developments. Apart from their permanence and the opportunity they provide for really brilliant colour - characteristics shared with some other forms of decoration - the main advantage of tiles over other media for applying ready-made pattern is the smallness of the unit which allows a variety of patterns to be composed from a few standard designs. The true pattern making tile is almost devoid of character when seen alone in the single tile; when many are assembled together in a pattern, it is the pattern as a whole that leaps into life, not the single tile. If the basic design is well conceived, several different patterns of markedly different character can be composed from the same tile. In tiles, as in some

other things (bricks, for example) the paradox of standardisation appears; the more the pattern on the basic unit is simplified, the greater is the opportunity for variety in its composition.

This idea of the pattern making tile has now been taken up by several manufacturers, and I shall confine my article to this type, discarding the pictured effects which are really more suitable to other media. Had I done so three years ago, my article would have hardly dealt with any but the products of the one manufacturer who pioneered this revival after the war. There are now plenty of pattern making tiles to choose from; but though there is a greater wealth of good material, I cannot report any other significant development during the past three years. The idea has spread through the trade, but instead of being developed further there is, if anything, a slight falling off - not in the quality of design, for there are many more good patterns than there were - but in the ingenuity of the simple tile that makes a multiplicity of patterns.

Pattern in relief

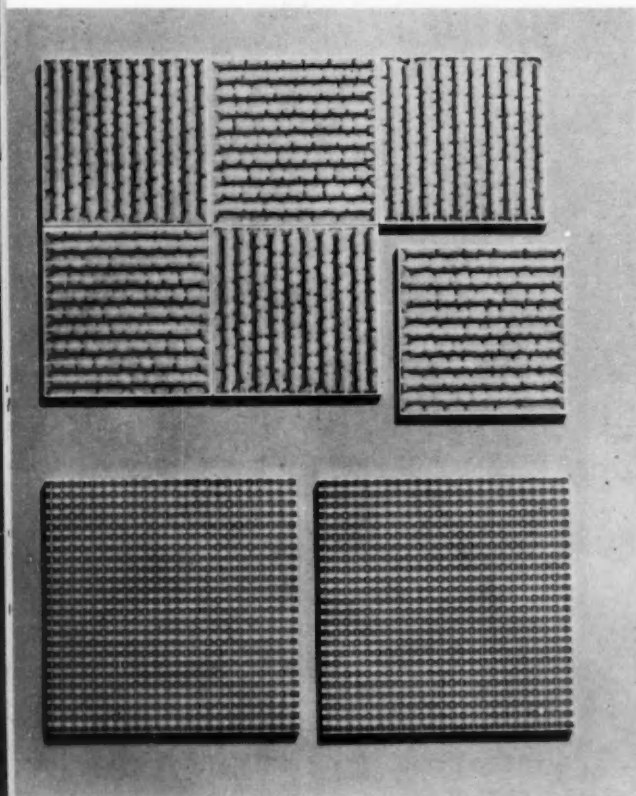
There has been one new development in technique: this is the laying on of glaze in separate stripes, either one way or crisscrossed, to give a textured effect in low relief. This has produced some very pleasant tiles indeed, of a quality that is not conveyed by a photograph, even a coloured one. This sort of tile is in demand by the builders' merchants who slab up fireplaces, because of its neutral character, but it has more life in it than the usual porridge-like 'fireplace' tile.

Being in relief, though slight, this type leads to a demand that I should like to make of the tile manufacturers this time. Several are now producing the pattern making tile. Now let us have the same idea done in relief. An abstract shape, laid off-centre, in contrasting or self colour on a textured background, with textured tiles to match, might be the next step in development; but the shape must be an abstract one without naturalistic or Rococo reminiscences, so that it can be made to come to life in composition. I realise that the mould for pressing would be costly, but the pioneer would again reap the benefit. I gather that nobody as yet has this development under way.

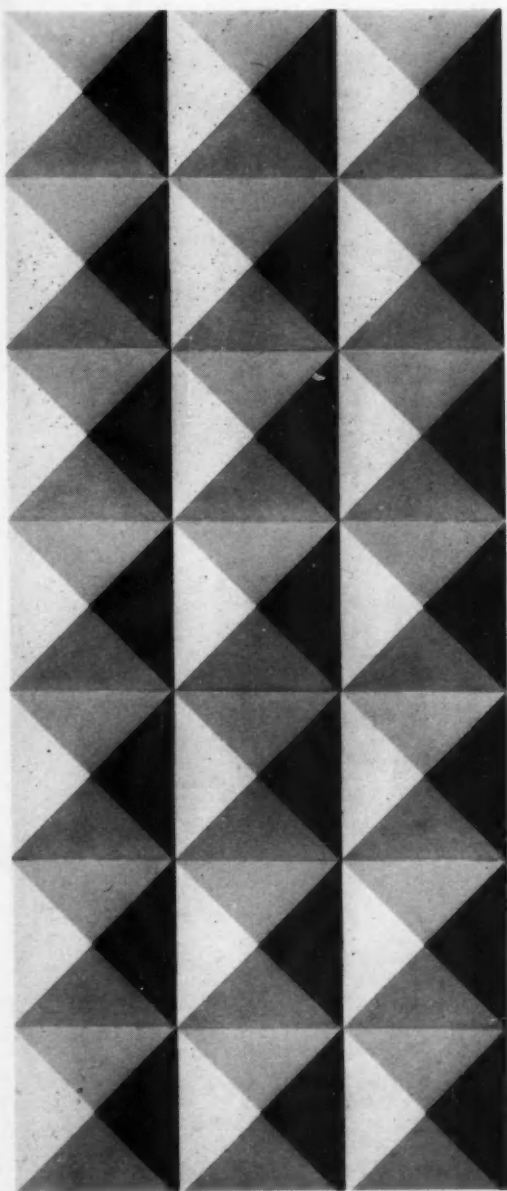
The architect's influence

The manufacturers whose tiles are illustrated (I made my selection mostly from those appearing in 'Design Review') have been questioned about design policy in their factories. Their replies show a considerable similarity of approach: first, they are unanimous in that they all have a design policy. The building industry is perhaps unique in the modern industrial world in

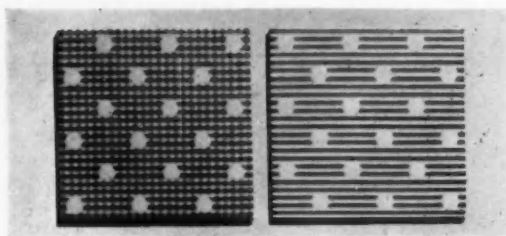
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2 Embossed effects achieved by laying on glaze in stripes, above one way, below crisscrossed. These effects might be cultivated more.
DESIGNER T. B. Jones. MAKER H. & G. Thynne Ltd.

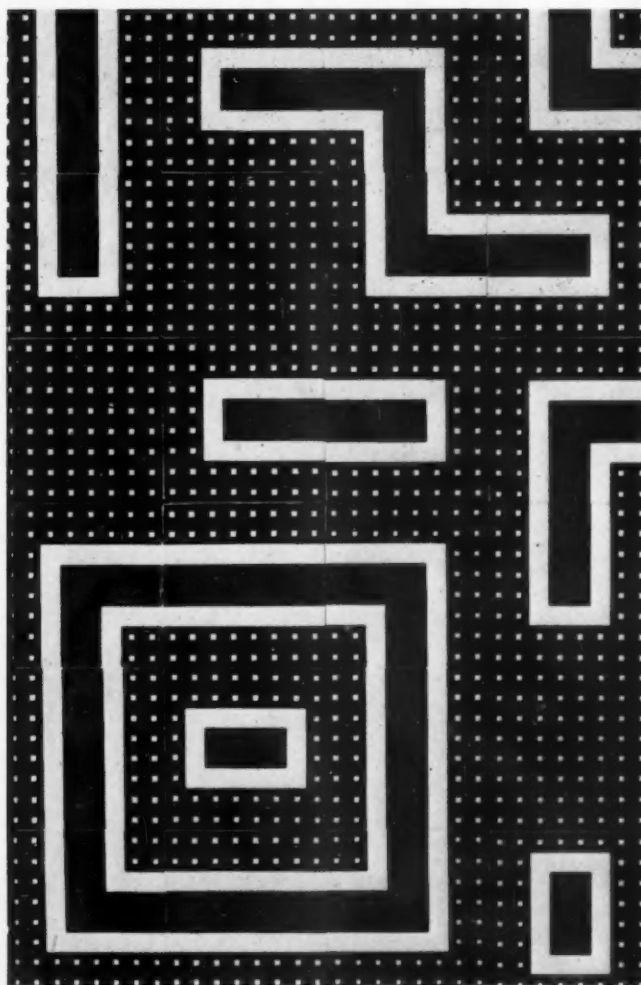


3 A pattern making tile in which the simplicity of the basic design allows a variety of patterns to be composed. DESIGNER A. B. Read.
MAKER Carter & Co Ltd.

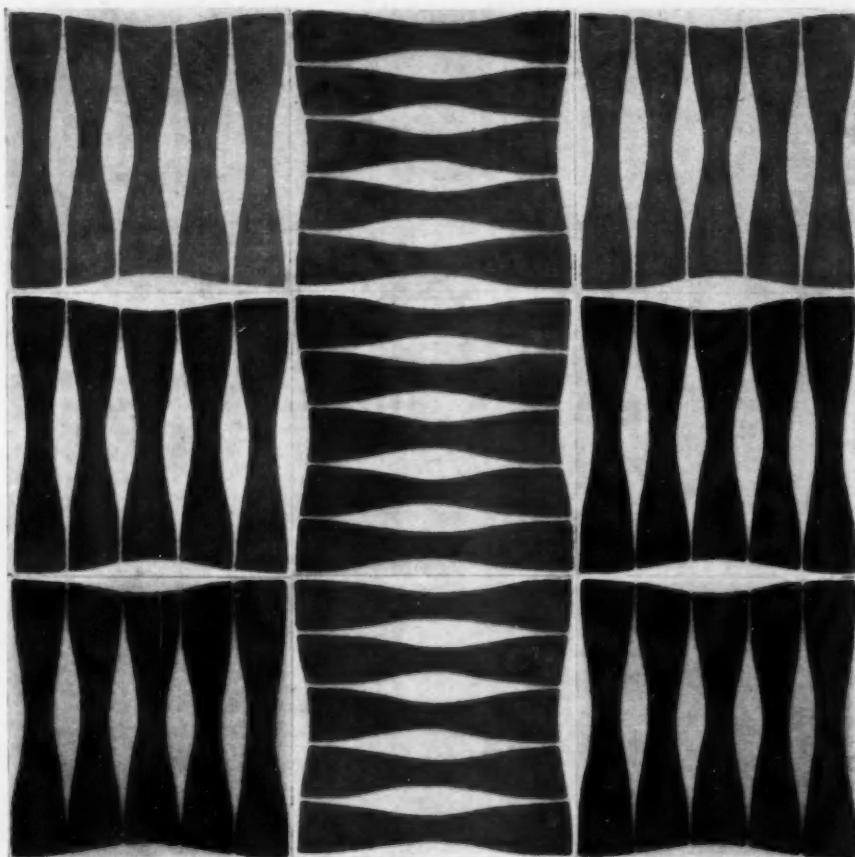


4 Gentle designs but with more liveliness than mere textures; this might be recommended to the fireplace trade. DESIGNER J. Donnelly.
MAKER Pilkington's Tiles Ltd.

5 A very interesting pattern making tile – foreshadowed in DESIGN three years ago, now in production – which offers an immense variety of patterns out of the five individual tiles. DESIGNER T. B. Jones.
MAKER Pilkington's Tiles Ltd.

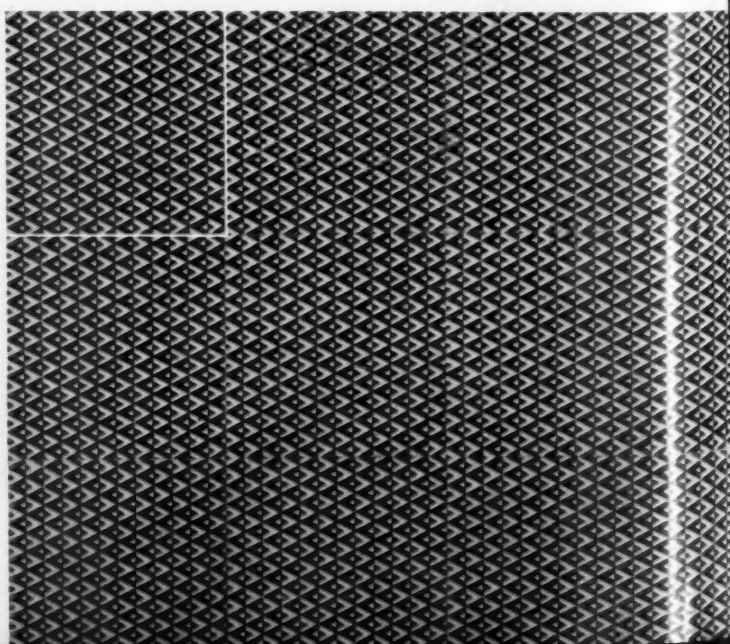


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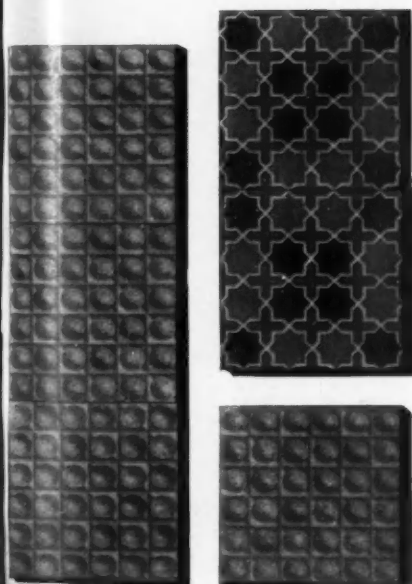


6 A design of good character, with the flatness appropriate to tiles. Although it has only two pattern ways, the opportunities of pattern making are multiplied by the number of colour ways also offered. DESIGNER T. B. Jones. MAKER H. & G. Thynne Ltd.

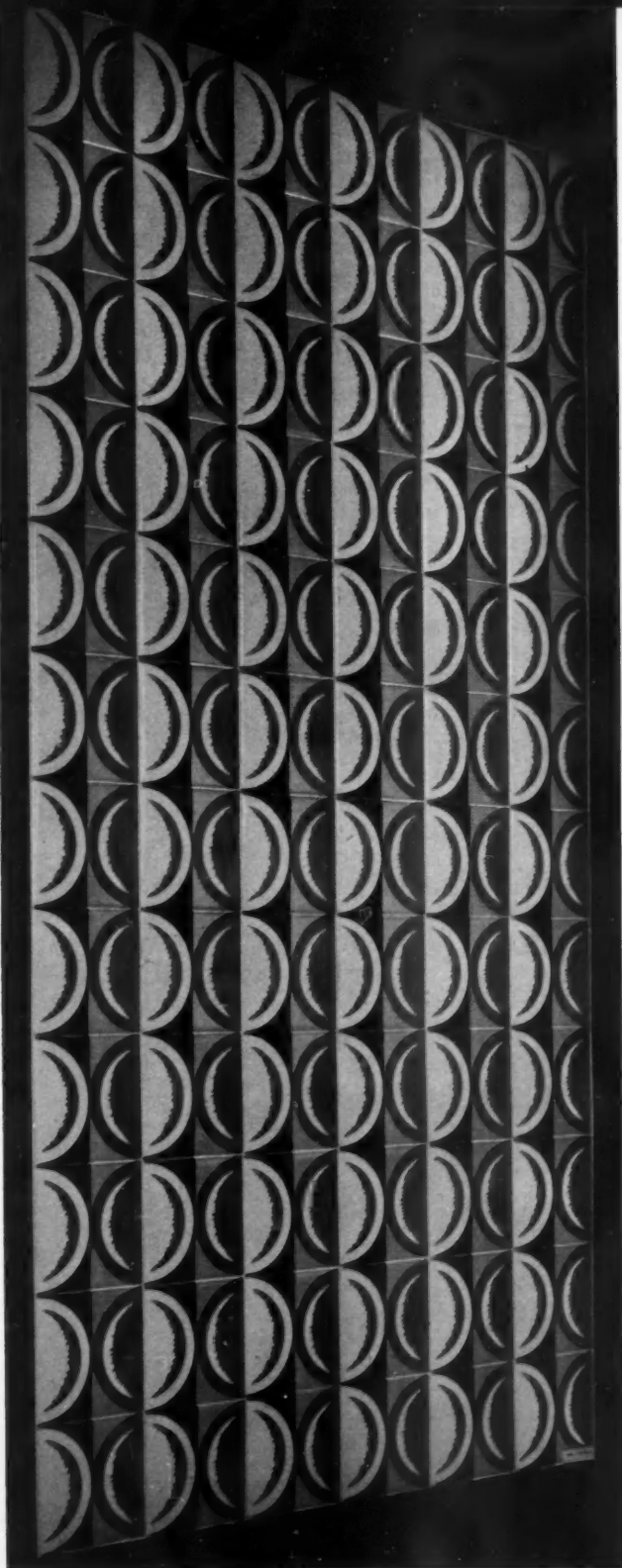
7 A small, scintillating design which would tell as a gay little pattern in a small room, or as texture in a large interior. DESIGNER A. B. Read. MAKER Carter & Co Ltd.



8 A handsome design with a sufficient number of pattern ways to obtain many different boldly striped or banded effects in large areas.
MAKER H. & R. Johnson Ltd.



9 Right, a design of Victorian character. Left, another quiet design, like 4, which gives a little more interest than a textured finish. DESIGNER Reginald Till.
MAKER Purbeck Decorative Tile Co Ltd.



continued from p 26

acknowledging the designer, that is the architect, as the leader of the assembly team.

My key question then to the manufacturers concerned their relationships with architects. Surprisingly, none of them retains an architect as consultant on design. Some manufacturers say that architects come to them bringing proposals for pattern designs in tiles for particular buildings, which are then worked up between the architect and the tile designer (consultant, or staff, or both). Evidently, a sufficient flow of such designs is released by the architects concerned to keep the manufacturer's stock full of good things. The success of this policy can be seen in the results. But others who replied that their design policy is "an internal matter", or that they "do everything possible to keep up-to-date with architectural development by studying the appropriate journals", would gain by strengthening their links with architecture.

Finally, a few words about trade literature: one manufacturer offers an excellent device for designing

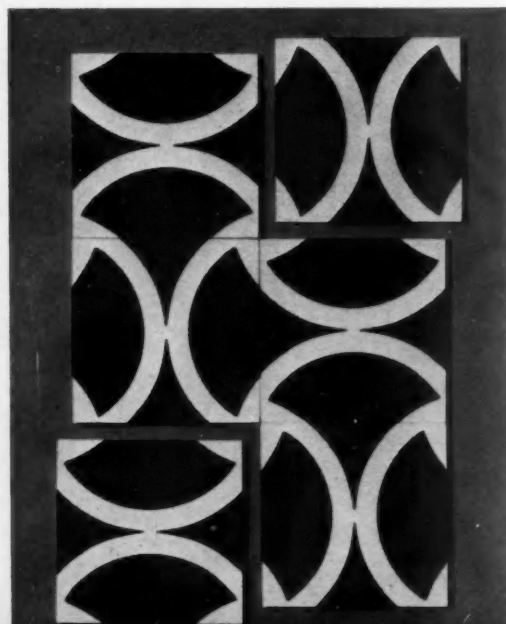
patterns with pattern making tiles. It is a tray with a depression in it, six inches square, to take 36 tiles at a scale of one sixth full size, the tiles being represented by pieces of cardboard one inch square with the design printed on them. With such a good idea for pattern making it is a pity that this manufacturer's later designs have deviated somewhat from the pattern making principle, imparting too strong a character to the individual tiles, which tend to look better when separated by plain or textured tiles in diaper fashion.

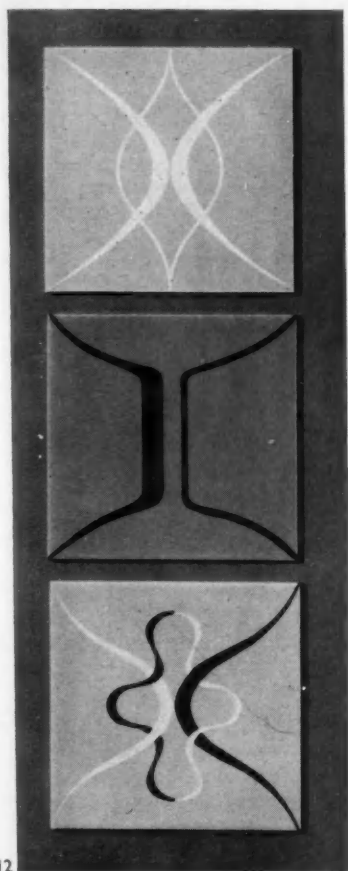
Speaking from the architect's point of view, I should like to make it quite clear what is wanted in trade literature. It is a reproduction *at full size* of each design offered (too often one is at a loss to know the scale of the design; it is even sometimes not clear whether the pictures represent a single tile or a whole wall), together with one example, or more, of the same tile in composition. This can either be a photograph or a drawing. Given this exact information, which should also indicate the colour ways, the architect will then be able to do the rest.



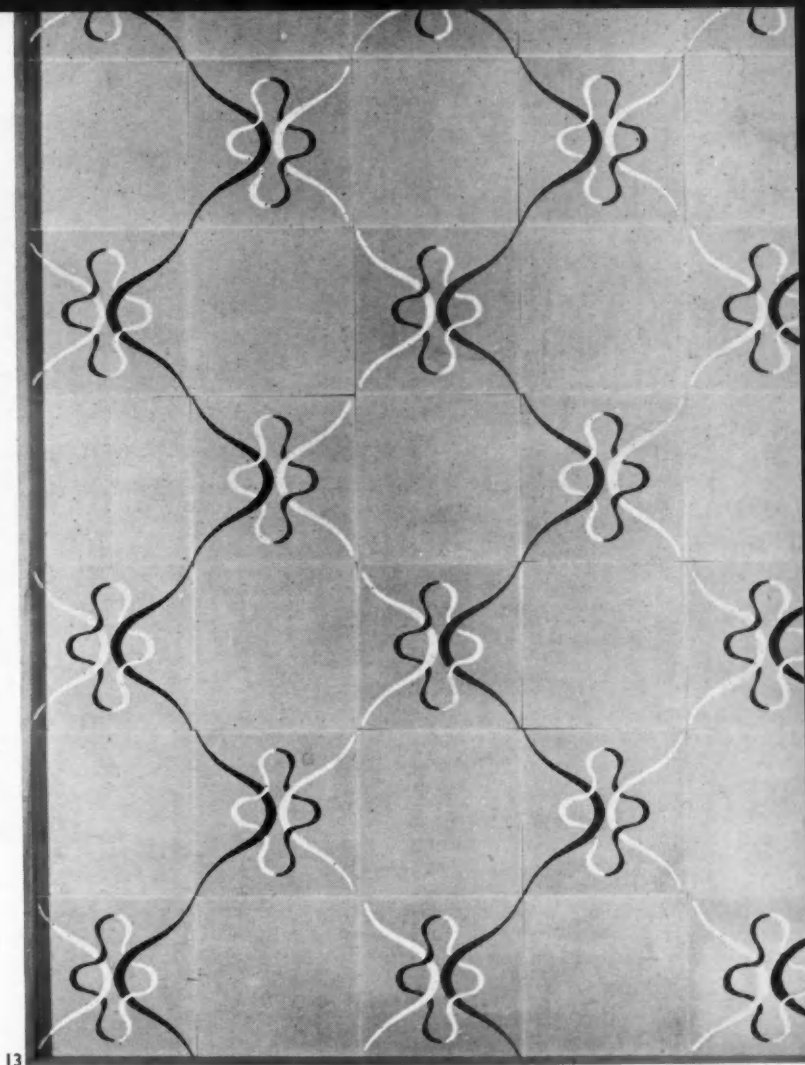
10 The apparent carelessness of the drawing is a device to give a richness of texture when seen a few paces away. The four pattern ways allow many interesting compositions on the wall. DESIGNER Peggy Angus. MAKER Carter & Co Ltd.

11 Although it has only two pattern ways this design has much else to offer. The way the design runs across the corners of the tile is very clever. DESIGNER F. E. J. Chinchin. MAKER Purbeck Decorative Tile Co Ltd.





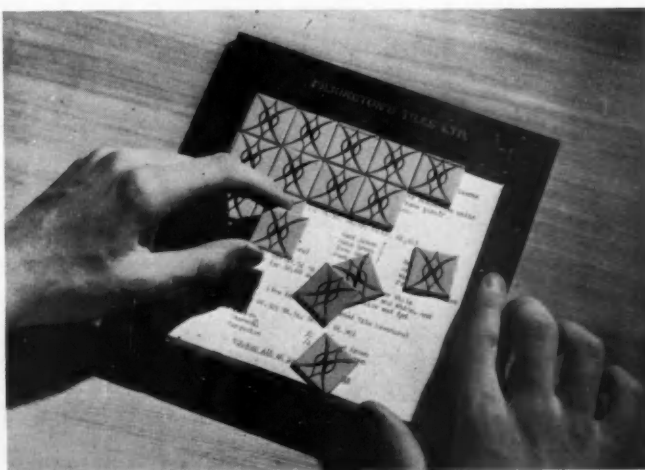
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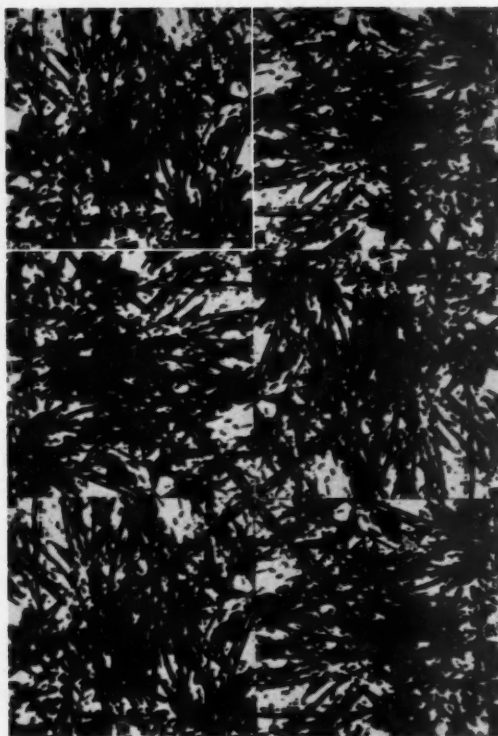
13, 13, 14 The idea of the pattern making tile has come into its own when a manufacturer provides such an excellent device, right, to enable customers to make up their own patterns. The device loses a little of its point when used for the designs shown on this page, which do not seem to have the right character in the single tile to take full advantage of the idea. Used for the same manufacturer's tiles shown in, 5, it would be most rewarding. DESIGNER G. Ormrod. MAKER Pilkington's Tiles Ltd.

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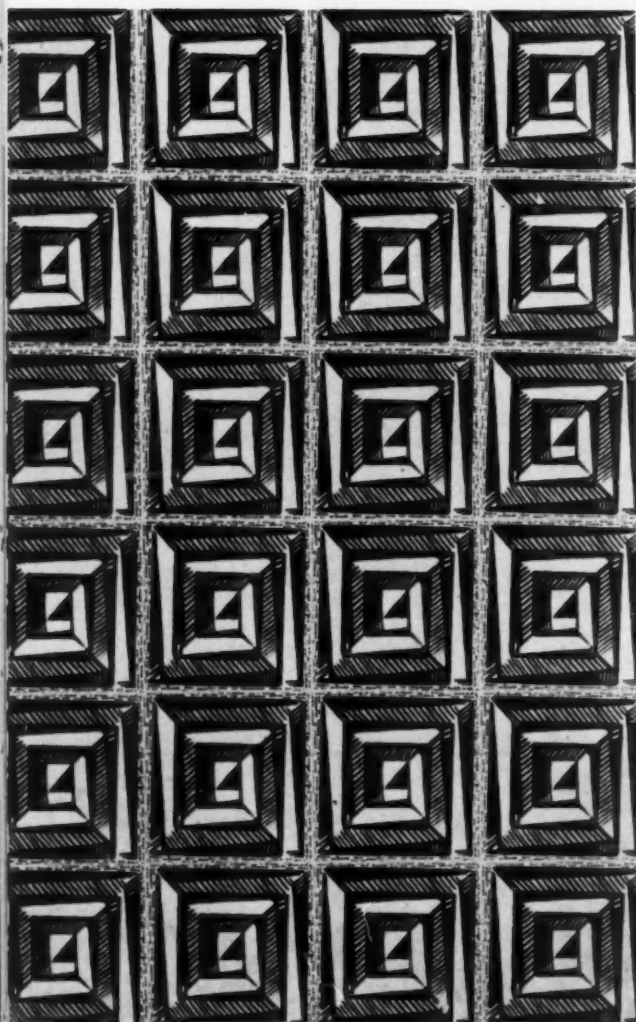


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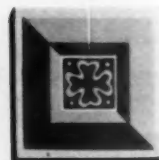
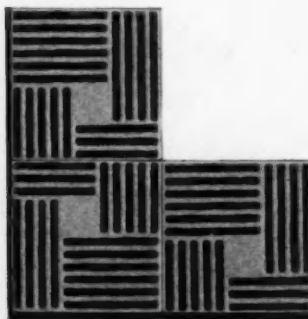
15 A group of experimental tiles for domestic or large scale pattern making. This new idea might be a growing point for future development. DESIGNER Tibor Reich. MAKER Colourcraft.



16 In this example the design is more important than the two pattern ways. The trompe-d'oeil effect and the studied roughness of drawing would impart a rich texture to a large wall. DESIGNER Reginald Till. MAKER Purbeck Decorative Tile Co Ltd.



17 Right, the simple diagonal division should provide a wide variety of patterns, but the central motif would tend to take control. Left, a pattern making tile with intriguing possibilities. DESIGNERS, left, H. R. Hidden; right, A. B. Read. MAKER Carter & Co Ltd.



FLEXIBILITY *in furnishing*

NORBERT DUTTON

Chairs with covers that are interchangeable and easily removed for cleaning are not only convenient, they may also encourage an economical but more adventurous approach to home decoration.

IT IS A CURIOUS PHENOMENON that what people admire in the shops and what they actually buy is not always the same thing. There is ample evidence of the public's interest in modern furnishing; contemporary furniture and fabrics are now widely displayed for sale and featured regularly in popular magazines. They are still, however, something of a novelty, and since furnishing a home is an expensive undertaking there is some natural reluctance to embark on too daring experiments.

Public acceptance of modern design could, I believe, be greatly accelerated if it were made easier for the consumer to experiment: to try out an adventurous fabric or wallpaper without being irrevocably committed to a permanent scheme of the same character. This implies a clear distinction between those items which are relatively permanent and must therefore be conservatively chosen, and those which are transient and 'expendable'. No such distinction is at present established, and a latent interest in a more adventurous approach to decoration is thus being discouraged.

Changing the interior

Under the heading of permanent items I include furniture, kitchen fittings, cooking and heating appliances, light fittings, cutlery, tableware, bed linen and carpets. These items represent a large capital outlay, and are normally expected to last for a considerable time. A conservative design is, therefore, appropriate, and ornamental idiosyncracies or decorative assertiveness are obviously out of place. On the other hand decorative items, such as fabrics, paint and wallpapers are by their nature impermanent and one expects to replace them from time to time. Here a more adventurous choice is easy because the decision is not a permanent and hence not a very grave one.

If the furniture is visually neutral, it will harmonise with any appropriate scheme of decoration, so that the whole character of an interior can be transformed by a

change of fabrics, wallpaper or paint. By 'visually neutral' I do not, of course, mean that furniture should be lacking in character, either in form or in the choice of *structural* materials. I mean simply that it should not impose any restriction on the pattern of the fabrics with which it is associated.

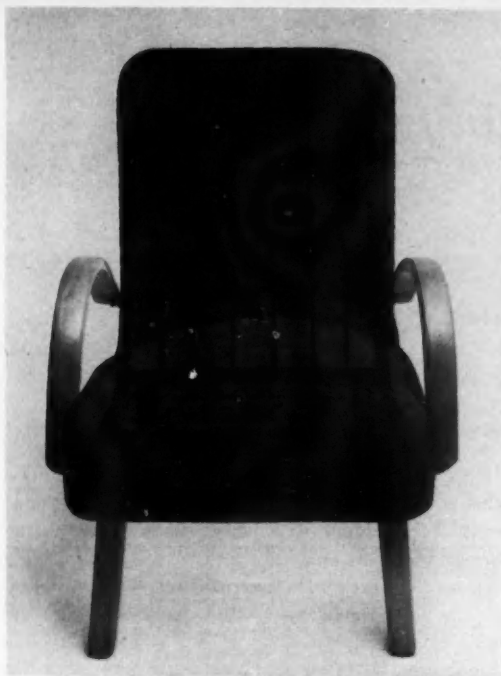
But in upholstered furniture this is precisely what happens. What I have classified as permanent and transient materials overlap, and the character of the fabric becomes a determining factor in any scheme of decoration; initially because it is the most costly of the 'decorative' features and subsequently because, unlike the others, it cannot be altered.

Let us suppose now that the functions of structure and decoration are separated. The fabric, instead of being integrated with the structure, consists only of covers for removable cushions which can be changed as readily and as inexpensively as the curtains or the wallpaper. At once the visual aspect of the furniture becomes flexible and it no longer exists as a barrier to experiment.

The argument that a fully upholstered chair is more comfortable is no longer valid. Rubber-covered tension springs with 'Latex Foam' cushions provide an admirable degree of comfort, while an un-upholstered frame chair is more readily adjustable to various alternative positions from sitting upright to reclining. I submit that *convenience* should be recognised as the desirable keynote of contemporary furnishing. Comfort must not, of course, be sacrificed; nor is there any reason why beauty or elegance should be.

The out-dated 'three piece'

By any standard of convenience the fully upholstered three piece suite is surely an anachronism. It is impossible to sweep under yet cumbersome to move; it occupies a great deal of space, and cannot be sent to the cleaners. The frame chair with loose cushions, on the other hand, can be stripped in a moment and



With a metal support frame and button-on cover this design was exhibited in the Homes and Gardens Pavilion during the Festival of Britain. In post-war Britain it re-introduced an idea that had been given only cursory trials in the 'thirties. DESIGNER R. W. Toothill. MAKER R. W. Toothill Ltd.



This chair is from the latest 'Ercol Windsor' range which uses removable covers. The frame is in natural wax-finished hardwood; the foam rubber cushions are supported on rubber webbing. DESIGNER L. R. Ercolani. MAKER Furniture Industries Ltd.

thoroughly cleaned and polished. There is nothing to wear out except, eventually, the tension springs, which are readily replaced. The covers can be removed for cleaning in a few seconds, and changed at comparatively slight expense. In consequence, neither the material nor the pattern need be particularly hard-wearing, and an adventurous choice becomes practicable. Upholstery, curtains and wall treatment comprise a completely flexible scheme of decoration.

Moreover, if a chair is regarded simply as a piece of 'structure' divorced from the fabrics by which its visual aspect is largely determined, and designed primarily for comfort and convenience, then this structural design can be in some degree standardised. Standardisation means larger manufacturing quantities and hence a lower selling price, since mass production techniques can be fully exploited and marketing simplified. There now exists, I suggest, an unnecessary and uneconomical variety of types on the market; yet this apparently wide choice is largely illusory, since the range of fabrics available for any given type of chair is restricted to those offered by the manufacturer. Fewer structural designs would cover the same requirements with complete adequacy, and could do so with no sacrifice to

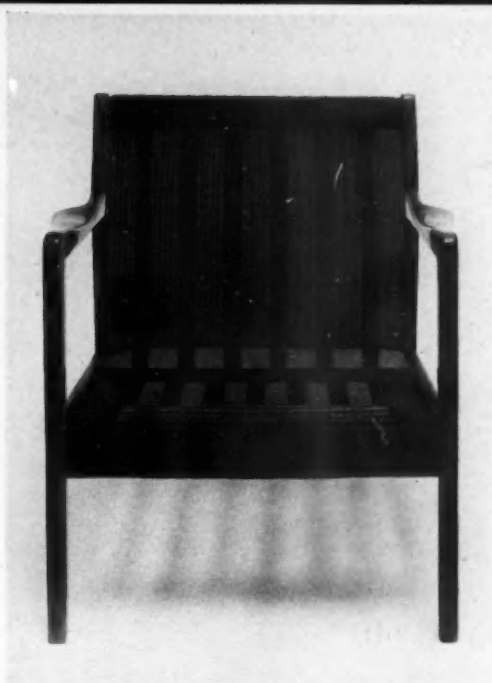
comfort or appearance; a notable improvement in hygiene and a substantial saving in cost. When buying, one would choose the basic chair – the frame – from a limited number of standard patterns, whereas the cushion covers, being selected independently and made to order, would offer a completely unrestricted choice. From the consumer's point of view this would seem to be both logical and desirable; and most developments which are logical prove, sooner or later, to be inevitable.

Not all furniture manufacturers would agree with Mr Dutton's point of view, and we asked Howard B. Keith, who is a director of HK Furniture Ltd, to give us his opinions. HK Furniture Ltd is well known for its high design standard in fully upholstered furniture.

"Mr Dutton divides the articles which make up a home into two groups, the permanent and the expendable. This division in itself indicates that the permanent group is the more important one. Therefore, in my opinion, this group cannot possibly be selected with a view to its being visually neutral and of indistinct design. Quite to the contrary it must be the most carefully chosen part, distinct in design and character as it must stand up to the test of time.



The frame of this chair is in natural beechwood and the cushions are of 'Latex Foam' with zip-on covers. Spare sets of covers are supplied with the chair to provide alternative summer and winter patterns. DESIGNER ISP Ltd. MAKER George Stone (Furniture) Ltd.



Of Swedish design, this chair has a Danish frame; its 'Latex Foam' cushions, with removable covers, are made and fitted in England. DESIGNER Folke Ohlsson. MAKER Dux. IMPORTER Finmar Ltd.

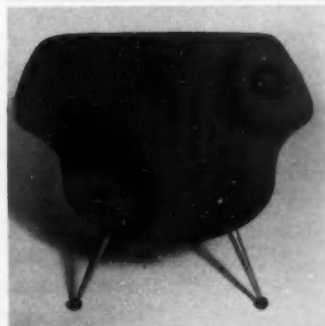
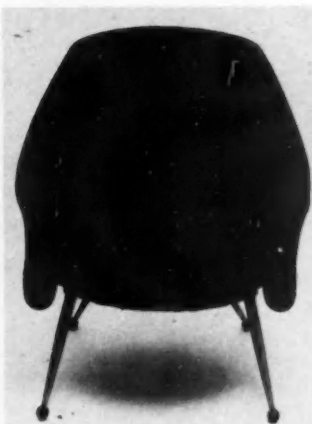
The three piece suite is as much an anachronism as the sideboard, 8-ft in height, divided by columns and with richly ornamented doors. The modern three piece suite consists of two or three carefully selected pieces of different design, but matching in character. The easy chair and settee can be easily moved provided they have been fitted with suitable and good quality castors. Mr Dutton's standardised, mass produced wooden structure, with tension springs and loose cushions, certainly has its place in the home, but it will never give a room the warmth and cosiness a fully upholstered piece of furniture can provide; in this damp climate, with our generally inadequate heating, nothing is more inviting than a comfortable, well constructed easy chair.

"Fully upholstered furniture can easily be dry cleaned at the owner's home at not too great expense, and if a good quality wool cover has been selected it will stay clean for a long time. Men have not yet considered it necessary to change over to washable cotton suits just because their suits have to be cleaned. Even in the most progressive and modern countries the up-to-date three piece suite is still being purchased by anyone who can afford the little more it costs than the open arm chair.

"We are living in an age of equalisation, standardisation and automation and it may be impossible to escape these factors in connection with motor cars, electrical appliances, cooking stoves, etc, but let us avoid for as long as we can the equalised, standardised, automatic home."

HOWARD B. KEITH

This Italian chair from Heal's shows a different approach to the problem. The chair appears to be fully upholstered, but the cover can be entirely removed; it laces, corset fashion, down the back of the chair and this is concealed by the 'drape'. DESIGNER Marco Zanuso. MAKER Ar-Flex.



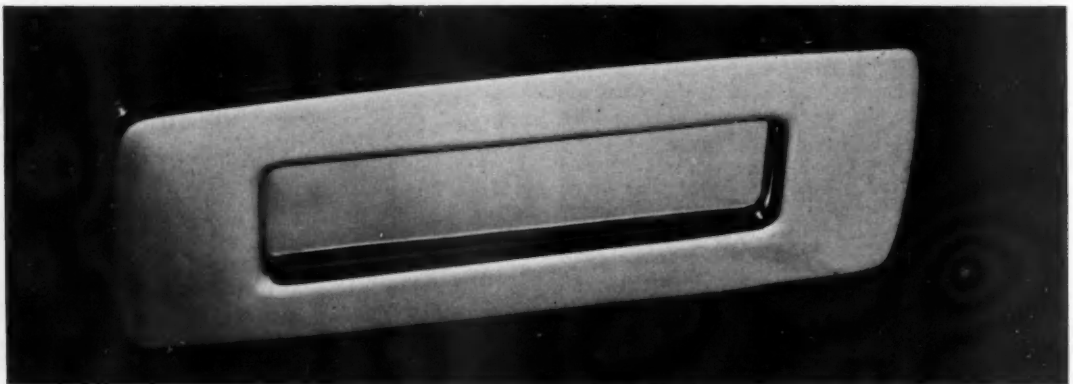
GOOD FORM 2

J. BERESFORD-EVANS

In this second article in the series on design analysis five products have been chosen to demonstrate some of the basic principles used by designers to achieve good form.

Corrections and refinements

When an object is small we can take in the whole of it at a fixed glance and, as it were, photograph it on the eye. But when it has an appreciable size the eye can roam over it; and when it is as big as a door the eye and head are forced to move in order to see all the parts. It is well known and generally accepted that some large buildings, like Greek temples, carried corrections to give the eye security in what it saw, but these corrections were proportionately very small. Nobody would bother to build a door with 1/16-inch entasis; but at smaller sizes a deliberate over-correction of the aberrations of the eye can give a firm reassurance to the shape. This turns the correction into a contrived 'refinement' which, if used with restraint, can help in building an appearance of good quality.

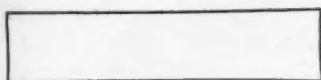


LETTER PLATE

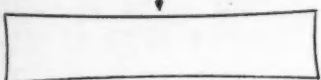
Designer J. T. Boardman

Maker J. P. Fielding & Co Ltd.

We want no nonsense or pretention about a letter plate, and this one is virtually rectangular. Long rectangular forms, however, have a quality that seems to make them collapse, as if unable to withstand a pressure. This would be especially so when the narrowness is emphasized by a long hole within the rectangle. A slight move away from the undesired effect of concavity will reassure the eye, as in this case where the swelling denies concavity without making the form seem un-rectangular. Here, however, the



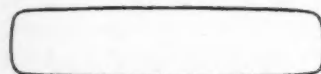
A long rectangle



appears to collapse



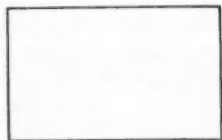
and is filled out to correct this



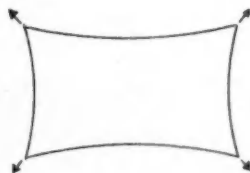
but is weakened by soft corners

ends are given a pronounced curvature, which softens and so weakens the form a little.

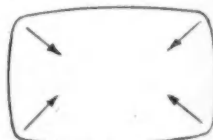
The opening also could with advantage have had the slightest curve, for the top edge appears to sag, and it would have been crisper if the corners had not been so well rounded. When a squat form is filled out to roundness, as in the fashionable quartic shapes, it loses much of the restlessness associated with square forms, and takes on a comfortable circular character; but a long rectangle such as this may lose strength if the corners are much worn away.



In a squat rectangle



the eye tends to fly off at the corners



but is contained by rounded forms

PETROL LIGHTER

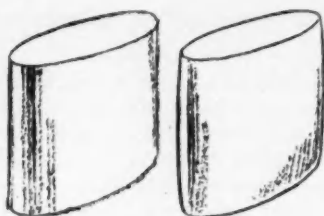
Maker Ronson Products Ltd.



Design: Number 92



A petrol lighter is so small an object that no visual corrections are necessary. This model, however, has been given a barrel or entasis for the quite different reason of reducing apparent size. The sides are curved from top to bottom with a radius of about 20 inches, which is not a great deal for an object $1\frac{1}{2}$ inches high but, being three dimensional, the effect is increased in that the curvature is spherical and runs round the corners. Curves of this kind,



Surface reflections define form; broad ones suggest fatness, sharp ones suggest thin edges

which would appear slight and almost trivial in a drawing, take on a full bodied emphasis as soon as they are seen in the round.

The effect of this curvature on the lighter is to concentrate the highlights and hard reflections on the narrow ends, where they die away towards the top and bottom plates. Rather than logically deducing the mass from overall widths in the middle of the body, the eye defines the shape and size by concentrating on these narrow tapered areas, and it is these which produce the desired effect.

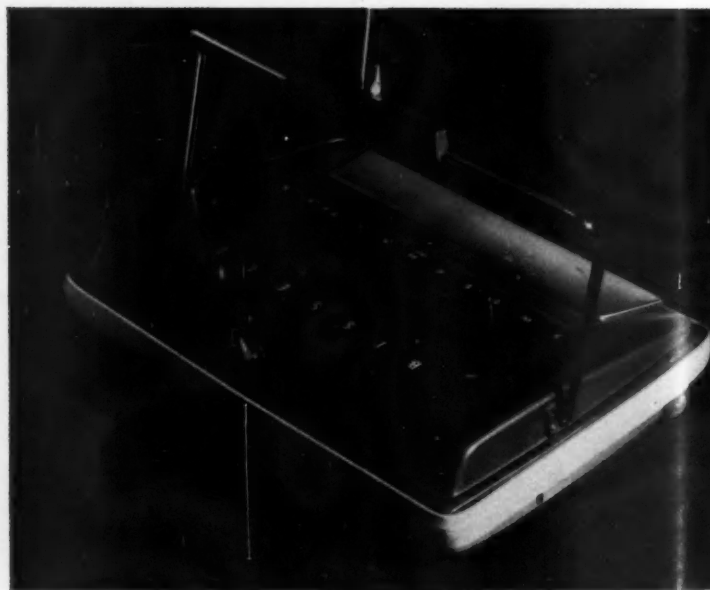
Colour emphasis

Form, the essential shape of a thing, however it is corseted or camouflaged, is inescapably the quality which defines its appearance. But form is seen through the play of light and shadow, through the sense of touch that we call texture, and by the parallel stimulus of colour. But while colour is borne upon and must be subservient to form, it can be used to underline certain characteristics or to divert attention from others. This is a matter of comparative emphasis, not to be confused with camouflage which is a disruption of form to produce differing results.

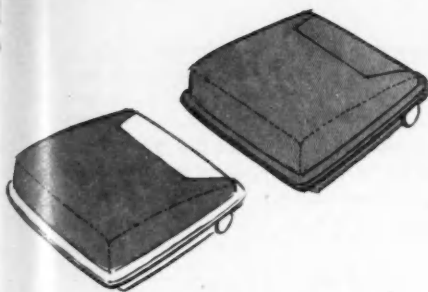
CARPET SWEEPER

Designer Harley Earl Corporation

Maker Halex Ltd.



Stemming from a casual window shopper's inspection, my memory of this product was of something very thin, closely hugging the floor and altogether remote from the generalized concept of a carpet sweeper. Memory left no room for brushes or dust receptacles, so something was obviously wrong with



The sweeper would appear more bulky if finished all over in the same colour

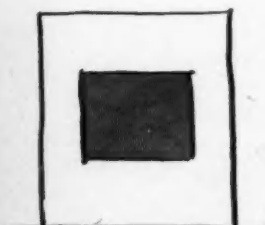
memory, and I went back to the product to find it slim indeed, but with a sensible depth.

Clearly the difference between the conceptual view and the real size was due to the use of colour. We can see that the eye is held firmly by the stronger coloured top and is stopped short of taking in the complete mass by the light-coloured rubbing strip which surrounds the casing at its widest point, mid-way between the top and bottom surfaces. Beneath this rubbing strip the casing is finished in a medium grey colour which merges with the background and tends to escape notice. This causes the eye to identify the centre line with the base of the sweeper and to discard that which is below.

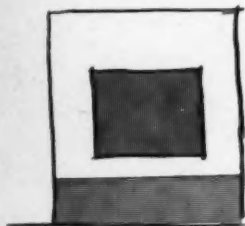
'WIDE FIRE'

Designer Richard Hutts

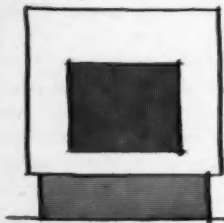
Maker Wilmer Lee & Co Ltd.



Colour can divide a form



or emphasize physical separation



Design: Number 92



The modern restricted throat fire requires the front opening to be reduced by closing in from above and below, so that we see the fire through a comparatively small aperture. The level of the fire is thus well off the floor, yet instinctively we prefer it to be as low as possible.

In this fire the casing is made to form a frame to the opening, accentuated by a light inside trim and by bold mitres. The necessary height, to cover builders' standard fire backs, is gained by an easy slope at the top, and the whole coheres to make a logical gathering of emphasis on to the fire itself.

But to have carried the frame down to the floor and pierced it for the ash door would not only have been cumbersome, it would also have made the fire opening appear too high up in the centre of the frame. The designer has therefore allowed the lower edge of the frame to form a strong horizontal line

close to the fire opening to create a clear visual separation from the base. This has been emphasized by a change of colour and texture, both well chosen.

In this way the eye is drawn to the dominant frame edge and so overlooks the darker base, persuading the mind that the height of the fire opening is measured from the frame rather than from the floor. Thus the fire appears lower on the ground than in fact it is.

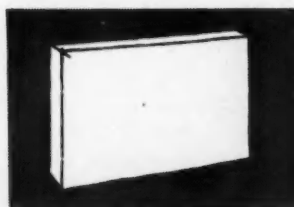
Solids and voids

Form can be realized either as a dense solid or as a piece of space that is marked out by insubstantial planes. A building, seen at a distance is a solid mass; but on closer acquaintance it is pierced by doors and windows which define the plane of inside and outside. Similarly a closed box is just so much shipping tonnage, but once it is opened its external form is reflected in the interior which has a related but differing character. This alternation of inside and outside concepts of displacement and capacity is at the heart of our interest and pleasure in form, and we are always ready to imagine the inside or allow the mere hint of a void to suggest that it is the entry to a space within.

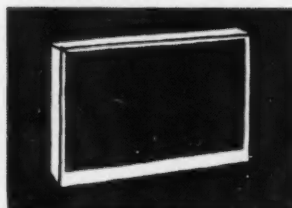
PIANO

Designers Ward & Austin

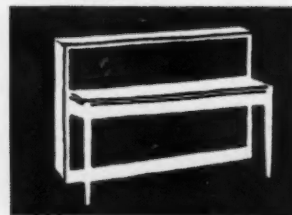
Maker Danemann & Co Ltd.



Unrelieved solid



Contrasting light frame



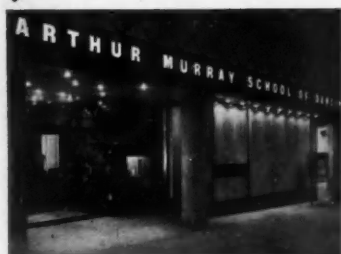
Solids and apparent voids



The frame of this piano is enclosed in a severe rectangular case that could hardly be simpler. It has been kept very thin and the appearance of lightness is helped by using a pale mahogany outer frame (pale colours usually suggest lightness in weight). Had this been all we might read the dark front panel as the face of a ponderous mass; but the front is cut sharply across by the keyboard, an area of strong contrasts and concentrated interest, so that attention is drawn forward. The darkness of the panel will now tend to read as a void, in the same way that dark objects cease to be seen behind the light tapes of a camouflage screen. The interplay of solid forms and apparent voids is further emphasized by the thin light-coloured legs which, with the keyboard, establish an imaginary plane in front of the cabinet and serve to enclose a volume of space as an integral part of the design.

The south wall of the reception area is faced with Genoa marble and the north wall panelled with Nigerian walnut. The furniture is by Ernest Race Ltd, and the chandelier is by the Italian firm Arteluce.

The fascia of the school, designed by Peter Moro. The doors are flanked by a slab of Genoa marble which continues through to the reception desk in the entry hall.

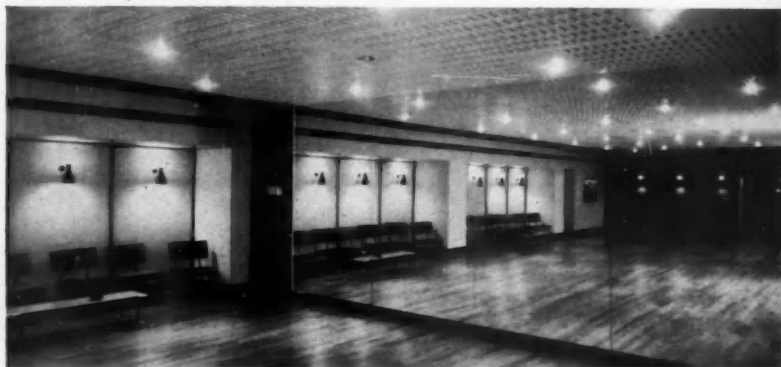


Decor for dancing

The main ballroom has a light waxed maple floor and a special acoustic ceiling. The backs of the seating recesses are covered in yellow fabric and the wall reflected in the mirror is painted a dark red. The wall brackets were specially designed for the school by THM Partners; the red and black chairs and white marble tables were provided by Conran Furniture Ltd.

THE ARTHUR MURRAY SCHOOL OF DANCING, which was opened recently in a new building in Leicester Square, London, represents a complete break from the drabness we tend to associate with dance halls and dancing classes in England. The Arthur Murray schools are now well known in the United States and Canada, but this is the first one to be opened in Europe. A team from THM Partners designed the interior of the school, under the direction of Lucy Halford.

There is one main ballroom, and three smaller ones, together with several interviewing rooms where the first lessons are given. In all these rooms one wall is mirrored partly to enable the pupils to see themselves dancing, and partly to give the impression of space. Each room has a different colour scheme; greys, greens and blues predominate, with the upholstery of the furniture and the curtain fabrics providing bright colour contrasts. In the main ballroom and the junior ballroom special acoustic ceilings have been installed. The school is gay and luxurious, but at the same time there is a certain restraint and formality that distinguishes it from the usual dance hall décor. The main contractor was David Esdaile & Co Ltd.

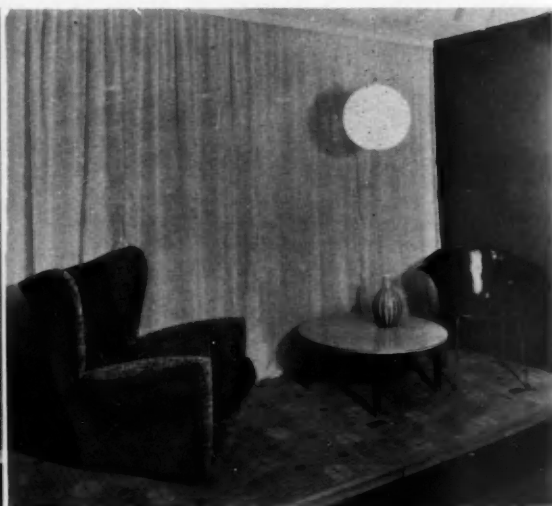
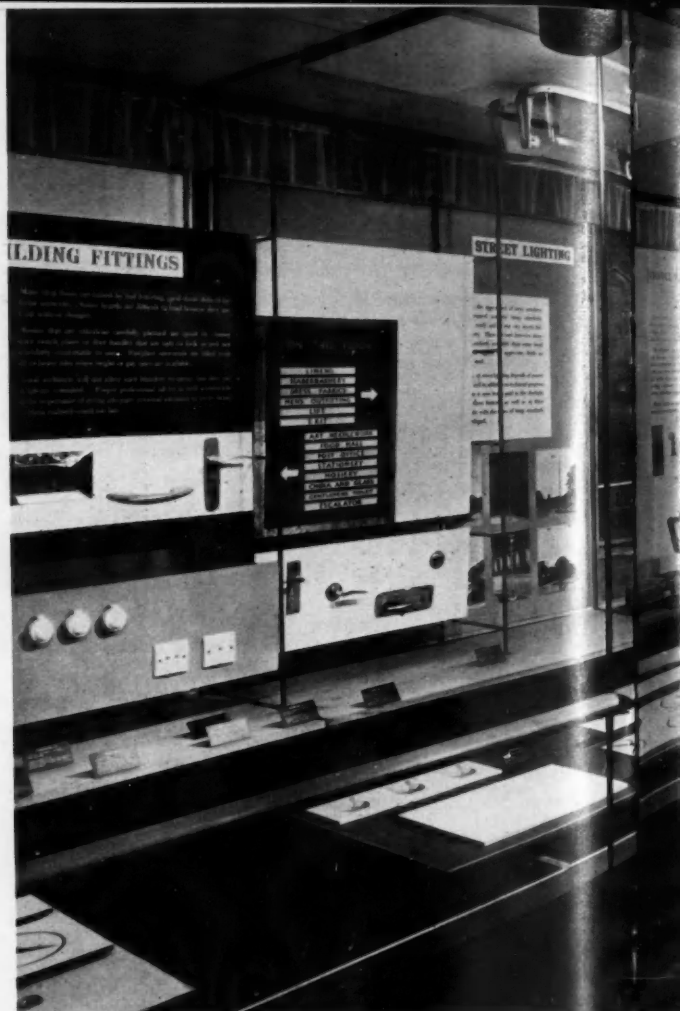


Enterprise in Scotland

RIGHT The display stands have been designed so that they are easily set up and dismantled. Since space was restricted the exhibits are highly selective in order that as wide a range as possible could be shown.

BELOW Furniture and furnishings are shown in these simple room settings. The dining chair on the left is made by Gordon Russell Ltd, and the other chair is by Everest (Long Eaton) Ltd. The 'G-plan' dresser is by E. Gomme Ltd, the lamp standard by H. C. Hiscock Ltd and the carpets by James Templeton & Co Ltd.

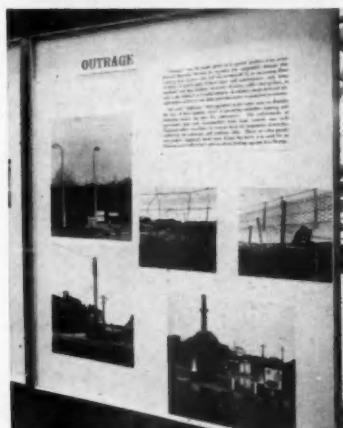
BELOW, RIGHT H. K. Furniture Ltd made the upholstered chair, and the dining chair in moulded glass fibre was made and designed by Aidron Duckworth. The coffee table is by LM Furniture Ltd.





DESIGN TODAY, an exhibition organised by the CoID Scottish Committee in association with local chambers of commerce has been touring Scotland this summer, and opens in the Royal Scottish Museum, Edinburgh on August 20. The exhibition covers a wide field of design, and includes printing, packaging and street furniture as well as things for the home. It has been designed by Jack Notman so that it can be easily adapted to the various rooms in which it is shown and fit into one van to be moved from town to town. There are several 'room settings' which show furniture, carpets, wallpaper and lighting equipment, as well as smaller displays of building fittings, travel goods, tableware, kitchen furniture and other items. Most of the exhibits are British and have been chosen from 'Design Review', but a few well designed foreign goods are also included. The exhibition has aroused a great deal of interest in each town it has visited, especially among retailers. It opened in Airdrie last May and the tour so far has included, among other towns, Perth, Stirling, Kirkcaldy, Oban, Inverness and Ayr. The exhibition remains in Edinburgh for the period of the 'Festival', and then goes on to Aberdeen and Dundee.

In order that the exhibition should be as representative as possible, the CoID Scottish Committee has arranged several specialised displays. 'Design in Print' and 'Packaging' are familiar aspects of design; the 'Outrage' photographs however are new to this type of exhibition and have aroused a good deal of interest.



Export initiative

American demand improves design in the Irish linen industry



THE IRISH LINEN INDUSTRY centred on Belfast and the six counties of Northern Ireland holds a proud position as a dollar earner in the British economy. Some 65 per cent of the industry's production is exported and the largest market is the USA, averaging £8 million worth of linen a year.

It is generally thought that a healthy export business can only be maintained on the basis of a firm, but lively and discriminating home trade. It is said that the home base should provide the opportunity for trying out and developing new ideas for future export success. However, in the case of the Irish linen industry this principle has not been applied. In the majority of its products design standards for the home trade are much lower than those acceptable in America and new ideas have been rare. This is particularly true of damask design and machine embroidery. Even in the case of woven effects in colour, and in printed design, the new ideas have usually been an infiltration into the home market following export initiative.

The linen industry, through the Irish Linen Guild, is fully conscious of the importance of the need to plan now for its own future prosperity. It is therefore most encouraging to see that several Northern Irish firms are producing good modern designs for the home market. They have realised that progressive design ideas are the most effective way of keeping the industry's products in the forefront of the buying public's mind. Many printed designs on table linen and glass cloths already reach a high standard and the incongruity of putting attractive modern packaging around damask of thoroughly uninspired design may soon be realised.

DAN JOHNSTON

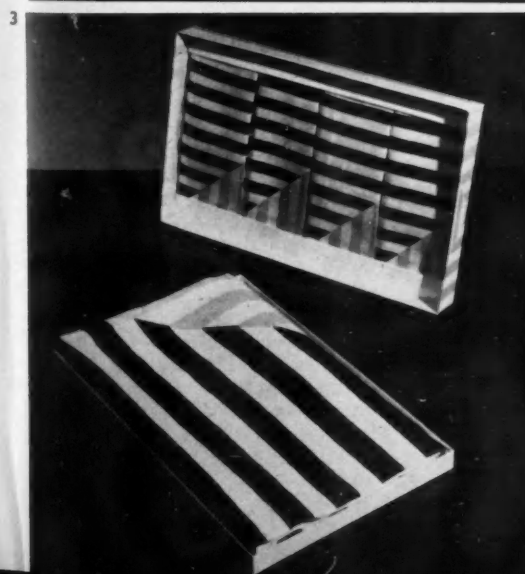
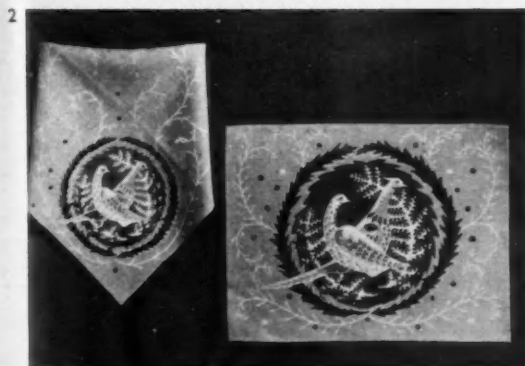
◀ 'Mimosa', a freely drawn floral design by Sarah Wright, is produced as a furnishing fabric on Irish linen by Lyons & Grosse Ltd of Belfast, a young firm with progressive design ideas.

1 Samuel Lamont & Sons Ltd has realised that a new field has opened up for ephemeral but well sketched patterns on glass cloths, such as 'Cuisine', left, by Eileen Bell and 'Kitchen Window'.

2 'Pheasants' is an Irish linen luncheon set; a good example of confident drawing in the modern manner. Designed by Robin Thomas for Mill House Fabric Printers Ltd, Penzance.

3 'Candy' is an attractive printed tablecloth and napkin set, shown as an example of the high standard of packaging now being applied to linen products. Designed by W. A. Rondas for Fragonard Ltd.

4 'Tonga', a bold printed design available as table mats and napkins on Irish linen and as a table cloth set on long staple spun rayon. Designed by W. A. Rondas for Fragonard Ltd.



Overseas Review

Selecting designs

The selection of industrial products as examples of good modern design, and their display in one form or another, have long been considered perhaps the most powerful method of influencing taste, and in the long run of improving the design of the products themselves. In Great Britain, The Design Centre represents the culmination of a series of both large and small exhibitions held over the course of 41 years, first by the still active Design and Industries Association and more recently by the CoID. But if the Design Centre, in its conception and scope, is unique in the world, there are many organisations in other countries which have similar ideals and which have found expression for them through the media of selected designs for display or reference.

Three completely isolated events in recent months serve to remind us of the world wide extent of these activities. The first, and most topical, is the opening in Oslo of a permanent exhibition of well designed Norwegian domestic goods. Called the 'Forum', it is similar in many ways to our own Design Centre and represents a major step forward in the promotion of interest in the growing Norwegian industries. But the prototype for this kind of exhibition already existed in Scandinavia. Copenhagen for 25 years has had 'Den Permanente' which, like the new 'Forum', has goods selected by a committee, and with exhibits on sale to the public. The Canadian National Industrial Design Council also has a permanent 'Design Centre' in its headquarters at Ottawa, in which exhibitions of various types are held including the

annual displays of merit award winners. In Germany the Industrieform Verein has recently opened a permanent exhibition of industrial products at the Villa Hügel, the former home of Krupp the wealthy Ruhr manufacturer, and this will be discussed later in DESIGN.

In most countries today occasional exhibitions of selected designs are held and represent a significant contribution to modern industrial life. Outstanding and perhaps most influential of these were the 'Good Design' exhibitions held by the Museum of Modern Art in New York and Chicago. Now alas discontinued, these displays brought together advanced designs from all parts of the world. Like the fine art exhibitions held by the museum, some outstanding exhibits have been retained in a permanent collection, and these have been supplemented by designs representing landmarks in the development of the Modern Movement and extending back to Art Nouveau – the style which first broke away from the moribund traditions of the nineteenth century. Other museums have collected pieces illustrating certain aspects of modern industrial design – the Victoria and Albert Museum, for example, or the Röhsska Konstslöjd Museum in Göteborg – but nowhere else is the historical development of the Modern Movement treated so comprehensively. Though the collection, through lack of exhibition space, is kept in store and is not normally available for public inspection, something of its scope can be seen in a magnificently illustrated volume produced to commemorate the twenty-fifth anniversary of the Museum of Modern Art. The publication of this book is discussed more fully on page 48.

Exhibitions and museums are not the only expressions of a growing interest in industrial art. Apart from magazines which give publicity to the subject – 'Industrial Design' in America, 'Stile Industria' in Italy, 'Bonytt' in Norway, 'Forum' in Sweden, 'Industrial Art News' in Japan, 'Art and Industry' and DESIGN in Great Britain, to mention some of the better known examples – there is the illustrated stock list, a reference for the best designs available on the market. The CoID has its 'Design Review' a photographic and sample record containing over 8000 items, and today forming a necessary adjunct to The Design Centre exhibition of products in the round. Others are published in catalogue form – the Canadian National Industrial Design Index for example, or the 'Catalogue of Goods' produced by the Swiss Werkbund. The forerunner of all these, however, was the 'Deutsche Warenkunde' first produced by the German Werkbund in 1931. The first and subsequent volumes, which can be seen in the CoID library, make an impressive record of achievement in pre-war German design. Now the re-formed Deutsche Werkbund has produced its first postwar catalogue and this is illustrated and discussed on page 49.

These three events do not in themselves amount to major landmarks in the development of world design. They do nevertheless show that efforts are being made on a wide front to improve the appearance of things used in everyday life. Thus the consistent propaganda for good design in countries which are markets for our own goods calls for redoubled efforts by British manufacturers to ensure that their designs are among the best that can be produced.

Norway

Permanent exhibition

'The Forum', a permanent but changing exhibition of durable consumer

goods was opened in Oslo recently by Princess Astrid of Norway. Housed on the ground floor of a nineteenth century building on the corner of Rosenkrantzgate, a main street in Oslo, it covers an area of about 3250 sq ft – a little under half the total floor area of The Design Centre in London.

The main stimulus for this new exhibition centre has come from Arne Remlov, editor of 'Bonytt', who was

also responsible for designing the interior and the display fittings. Exhibition policy is controlled by a committee of 11 members, and exhibits, which cover most types of product used in furnishing a home, also include jewellery, tourist souvenirs and toys. The exhibits are chosen by a jury of five, including the chairman, two of which are elected by the Norwegian Arts and Crafts Association, one by the

Society of Arts and Crafts and Industrial Design, and one by the Interior Architects Association. In addition four members of the craft associations have been elected to be available for technical guidance.

Of the products submitted to this committee for the current display about half have been rejected, while those accepted have come from nearly a hundred Norwegian manufacturers. Although 'The Forum' is a non profit making organization it operates to some extent like a good quality department store - for all the exhibits are on sale to the public. To avoid making a profit the 'retailers' commission on sales is adjusted on a sliding scale and is reassessed four times a year.

The exhibition is very much within the Scandinavian tradition of display technique - a tradition of austere formality in which prominence is given to the exhibit itself rather than the setting in which it is placed. General views of the exhibition and some of the products on show are illustrated here.

RIGHT Table lamp. DESIGNER Birger Dahl. MAKER Sonnico.

BELOW Display fittings, designed by Arne Remlov, consist of simple shelves or open sided cubes hung on adjustable vertical metal supports.

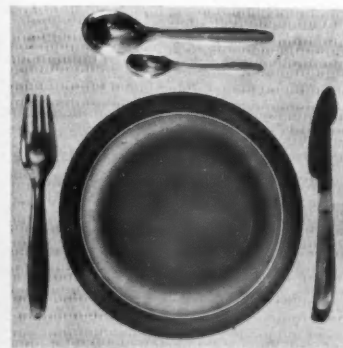


ABOVE Part of the main exhibition area. Grey haircord carpet, grey cotton cloth wall covering and white paintwork create an unobtrusive if slightly austere background to the exhibits.

BELOW Printed linen. DESIGNER and MAKER Rolf Middelboe.



BELOW Place setting in silver plate. DESIGNER Arne Korsmo. MAKER Tostrup.



USA

Museum Collection

To commemorate its twenty-fifth anniversary last year, the Museum of Modern Art, New York, published 'Masters of Modern Art', a volume containing over 350 reproductions in colour and black and white illustrating important examples from the museum's collection. The book is edited by Alfred H. Barr, Jr, director of the museum's collections; it is divided into four sections: painting, sculpture, drawing and print collections;

photography; the film library; and finally, architecture and design. Since its foundation in 1929 the museum has established a permanent collection containing examples of some of the most significant art forms produced during the past 75 years, and to this new pieces are added from current exhibitions of contemporary work.

The department of architecture and design, now under the direction of Arthur Drexler, has been built up on the same principle. Furniture, kitchenware, fabrics, office equipment, pottery and glassware are included in the design section, which was established in 1934. There are for instance about 180 examples of furniture ranging from a Thonet bentwood rocking chair of 1860

to recent designs by Charles Eames. In the past the 'Good Design' exhibitions provided a valuable source for new additions to this permanent collection. Without this source today, however, the problem of keeping up to date with the design collection will be immeasurably more difficult, and its value to posterity is thus in danger.

As its stands, the museum's collection remains unique in the world and includes many landmarks in the development of the Modern Movement in design. Since, however, permanent exhibition space for its display is not available, 'Masters of Modern Art' will become an important reference. Some of the illustrations in the book's design section are reproduced here.

*Putnam & Co Ltd, London £5 5s

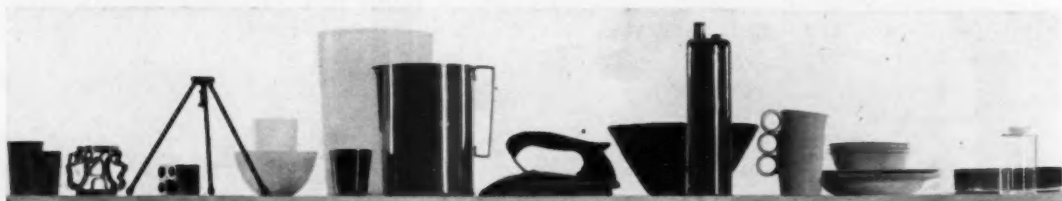


These chairs are examples of designs produced during the last 20 years, showing the experimental use of new techniques and materials. Top, left to right: armchair in moulded plywood with sponge rubber, designed, 1940, by Eero Saarinen and Charles Eames; sling chair in metal and leather, designed about 1938 by Antonio Bonet, Juan Kurchan and Jorge Ferrari-Hardoy; side chair in leather and metal wire, designed 1951 by Charles Eames; armchair, moulded plastic and foam rubber, designed 1948 by Eero Saarinen; side chair, laminated wood and canvas webbing, designed 1940 by Bruno Mathsson. Bottom, left to right armchair, laminated and bent plywood, designed 1932 by

Alvar Aalto; armchair, wood and woven cane, designed 1949 by Hans Wegner; armchair, moulded plastic and metal wire, designed 1948 by Charles Eames; side chair, moulded plywood and metal rods, designed 1946 by Charles Eames.

The department has an important collection of those smaller exhibits which it defines as 'Machine Art'. Most of the items illustrated here were designed between 1940 and 1950 and in the words of the department's previous director, Philip C. Johnson, "represent an attitude to design so basic and powerful that even the twentieth century handcraftsman has come under its spell".

Examples of Art Nouveau of the early twentieth century in the department's collection. The furniture was designed by Hector Guimard. A Lautrec poster and a screen by Bonnard are in the background.



Germany

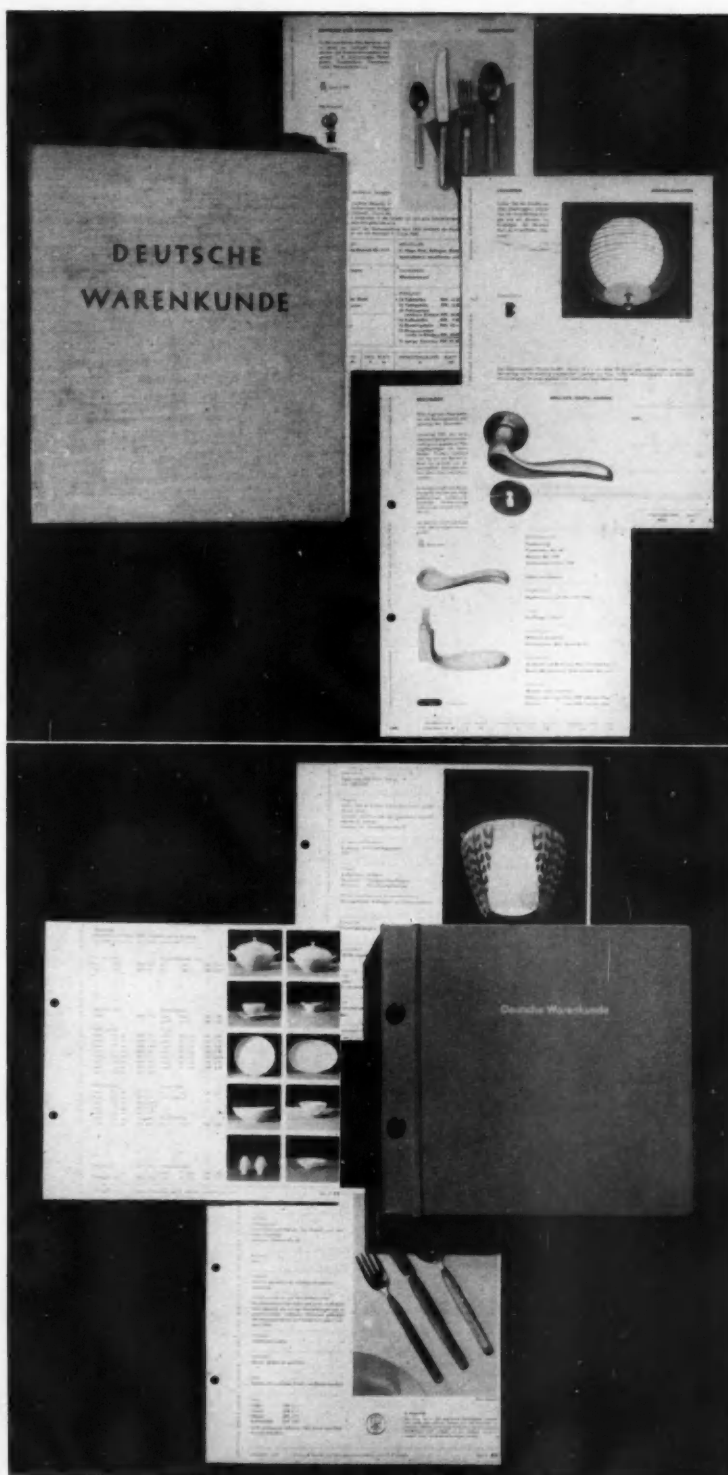
Catalogue of current designs

Although the idea of a catalogue containing independently selected examples of domestic products was first realised in Germany during the first World War, it was not until the publication by the German Werkbund of the first 'Deutsche Warenkunde' in the early 'thirties that a practical solution was found to the many problems involved. Earlier attempts had suffered from an inability to keep pace with new products on the market or were too restricted in scope to be of serious use to a wide range of people. The first basic addition of the 'Warenkunde' included about 100 pages of designs arranged under categories, and subsequently loose leaf additions were made during the period up to the outbreak of the second World War.

Now with the production of the first post war 'Warenkunde' the re-formed Werkbund, with the assistance of the Rat für Formgebung, has once more set about the task of creating an independent selection of goods which conforms to the highest standards of design and quality. Each product or group of products is illustrated and accompanied by manufacturing and trade details, including the price. Additional pages are published twice a year and new binders are available as each one is filled.

Seen together the pre-war and post-war editions of the 'Warenkunde' make revealing comparisons. In some categories like furniture and kitchen equipment, great progress has been made since the war. But there are many examples of cutlery, glass, pottery and building fittings in the pre-war catalogues which confirm Germany's role as a leader in the early development of the Modern Movement.

Examples from the pre-war 'Deutsche Warenkunde', above, and the first post-war edition, below. The cutlery in both cases is by C. Hugo Pott. PRE-WAR: Door handle, designed on ergonomic principles, made by Wilhelm Engstfeld. Lighting fitting, an early example of a double glass enclosure, by Glashüttenwerk Phönix. POST-WAR: lighting fitting, a recent development of the double glass enclosure, by Peill & Putzler. Pottery, elegant undecorated shapes, by Porzellanfabrik Arzberg.





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NEWS

CoID

Changes in membership

The CoID welcomes two new members recently appointed by the President of the Board of Trade: W. T. Wren, managing director of Allied Ironfounders Ltd, who has for some years taken a keen interest in the Council's work; he spoke at the Design Congress organised by the CoID in 1951 and will do so again at the second Congress which is to be held in September; and, Bernard A. Hopewell, managing director of Hopewells Ltd and president of the National Association of Retail Furnishers. Mr Hopewell has also spoken at courses organised by the CoID and is a great protagonist of good design in Nottingham.

The President has reappointed as chairman W. J. Worboys, a director of Imperial Chemical Industries Ltd, and the following members: Sir Colin Anderson, a director of the Orient Line; J. Cleveland Belle, a director of Horrockses, Crewdson & Co Ltd; The Lady Sempill, artist and designer; and Mrs Alison Settle, a journalist on the staff of 'The Observer'.

Three members of the Council have retired: Leslie Gamage, vice chairman and

joint managing director of the General Electric Co Ltd, who had been a member of the CoID since its formation in 1944 and has given it most devoted service. He has been chairman of the industrial committee since it was formed in 1948 and his knowledge of industrial problems has been of great value. Moreover, he has exerted considerable influence towards establishing in his own great company the principles for which the Council stands. Geoffrey Dunn, chairman, managing director and director of design of Dunn's of Bromley, has served on the Council since January 1950. Always lively and entertaining, he has brought to the Council table a wide and sympathetic knowledge of design problems gained by actual experience in retailing and manufacturing. Osbert Lancaster, artist and author, has served on the Council since March 1953. A leading designer and cartoonist, Mr Lancaster's advice has always commanded the attention of the Council.

Four members of the CoID Scottish Committee have been reappointed: Dr David S. Anderson, director of the Royal Technical College, Glasgow; Thomas Coughtrie, chairman and managing director of The Belmos Co Ltd; Professor Robert H. Matthew, professor of architecture, Edinburgh University; and The Lady Sempill, artist and designer.

During the year the Scottish Committee was unfortunate in losing the support of Baron Marchand who had served the Committee enthusiastically for a number of years, and also of W. Hope Collins whose other business commitments did not allow him to accept the President's invitation to serve for a further period.



Bicentenary medal

W. J. Worboys, chairman of the Council of Industrial Design, has been awarded the Bicentenary Medal of the Royal Society of Arts. The medal was instituted in 1954 as a commemoration of the society's bicentenary, and is awarded annually "to the person who in a manner other than as an industrial designer has exerted an exceptional influence in promoting art and design in British industry". The council of the RSA announces that the medal has been awarded this year to Mr Worboys for his outstanding services to the promotion of industrial design, particularly in connection with the establishment of The Design Centre.

Mr Worboys has been a member of the Council of Industrial Design since 1947, and was appointed chairman in 1953. He is also a director of Imperial Chemical Industries Ltd, and vice-president of the Association of British Chemical Manufacturers. Mr Worboys was born in Australia and took the degree of Doctor of Philosophy at Oxford as a Rhodes Scholar from the University of Western Australia.

The best of advertising

London has recently had the good fortune to see a graphic design show of an exceptionally high standard. The exhibition, which showed work of the members of the Alliance Graphique Internationale from 11 countries, was

organised by its British representatives led by Ashley Havinden; the setting in the RBA Galleries was designed by F. H. K. Henrion with great skill in the economical use of materials. It is to be hoped that other centres in Britain will also have an opportunity to see this exhibition.



REPORTS & MEETINGS

Design Centre discussion

Lord Conesford (formerly George Strauss, Parliamentary Secretary to the Board of Trade from 1951-1955) spoke about The Design Centre at a discussion arranged by the DIA recently. In his speech Lord Conesford said "I believe that The Design Centre is a new institution of the greatest value to British industry and of the greatest value to the buying public". . . . "The CoID is to be heartily congratulated. It has made a splendid start. Of course, it will make some mistakes, but not I hope by relaxing the standards, for that would be fatal". In the general discussion which followed one speaker urged that more attention should be given to experimental work in The Design Centre as he felt there was a tendency towards a rather non-committal style; another speaker wanted a 'chamber of horrors' to be included, and a third suggested that a section of 'typically British' goods should be shown for the overseas buyer.

continued on page 53

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continued from page 51

National character and design

At a recent meeting of the Royal Society of Arts, Paul Reilly, deputy director, CoID, gave a paper on 'The influence of national character on design'. Mr Reilly spoke of the "wishful thinking" that surrounds this subject - "One often hears from our own industrialists the plea for designs that are essentially British but yet recognisably of this century." It is true that in a shrinking world national variations tend to be obliterated, but Mr Reilly felt that in the more personal industrial arts, from architecture to pottery, many examples of national traits could be found, and showed illustrations of designs from various countries to prove his point. Britain at the moment is in a receptive mood in the field of design, but, Mr Reilly concluded, "the responsibility for standards of design rests not with the designer, nor with the public but ultimately with the patron or he who is in authority. If the client does not know his art from his elbow there can be little profit in discussing the influence of national character on design".

MISCELLANEOUS

Plastics design award

The Company of Horner's is offering an award to designers in plastics; the competition is open to anyone under 30 years of age and designers are asked to submit articles suitable for moulding or fabricating wholly or mainly from plastics materials. The Council of the British Plastics Federation is the administrator of the award for the Horner's Company, and entries should be sent to the federation at 47 Piccadilly, London W1 by August 31.

New RDI

The council of the Royal Society of Arts has appointed Reynolds Stone to the distinction of Royal Designer for Industry for his work as a letterer. Mr Stone is also well known for his book decoration and illustration. He teaches lettering at the Royal College of Art.

Birthday Honours

In the recent honours lists R. Y. Goodden, professor of design in the Department of Silversmithing and Jewellery in the Royal College of Art received a CBE, and an OBE was awarded to J. C. Pritchard, director and secretary, Furniture Development Council.

International award

Noral News, the works magazine of the Northern Aluminium Company Ltd, has won an award of excellence in the 1955 competition for house journals which is sponsored by the International Council of Industrial Editors. 'Noral News', a quarterly magazine first issued in 1951, obtained awards in the 1954 and 1955 national house journal competitions organised by the British Association of Industrial Editors.

Industrial designers in Belgium

The recently formed Belgian Association of Industrial Designers, which organised an exhibition at the Luik International Fair earlier this year has now amalgamated

with the Belgian Institute of Industrial Designers. The new organisation is to be known as the Institute of Industrial Aesthetics for Belgium and the Grand Duchy of Luxembourg.

Letters

'Intuition versus mathematics'

SIR: L. Bruce Archer suggests in his article 'Intuition versus Mathematics' (DESIGN June pages 12-19) that engineering designers rely less on calculation than most would care to admit.

Of course this is true. Engineering design is not an exact science. It is more an art with calculations as a background guide. Most engineering calculations are of an approximate nature, the danger lying in the fact that often the degree of approximation in general or in specific cases is invariably not known.

The handbooks, for example, give the formulae for finding the maximum stresses in a rotating disc. In practice a disc might have a number of lightening holes in it; or it may not be a disc at all but a shallow cone; or it might have masses attached at various points. In all these cases the standard formulae count for little. The designer is usually thrown upon his own resources, since he is generally not backed by a stress analysis department, nor has he a trained mathematician to assist him. The way out in most cases seems to be to increase the 'factor of safety' and use the standard formulae as approximations to reality.

In working out the size of any member or component subject to a load, the designer uses a 'factor of safety' which might be anything up to 15 or more. The very fact that he uses such large factors of safety is an admission that he does not know the real stress distribution (make therefore a generous allowance), he does not know the real effects of reversing loads (add a further allowance), he is not sure the material in bulk will behave as it did in a test sample (another allowance), and so on. To say that the designers' calculations are approximate is something of an understatement.

The effect of our state of knowledge on design practice can be seen in the machine tool industry for example. It has to be realised that at present it is virtually impossible to design a first class machine tool entirely on paper. Information on the working strains, which affect the machines' accuracy, on the degree of resistance to self-excited vibrations etc, can at best be calculated only approximately (how approximate?) and what mathematical theory is available is of more use in modifying a tested prototype than in original design. Some research has been started in this field - more abroad than in this country - but it is early yet to see how this is influencing design procedure. It is probably quite in order to suggest that over 90 per cent of the machine tools - indeed 90 per cent of all

engineering products - produced in this country are designed by more or less rule-of-thumb methods.

Our technical educational system is partly at fault. No positive attempt is made to teach engineering design and students are not brought face to face with real design problems. When they eventually do meet these they generally fall back on the practice of their particular drawing office - which might or might not have a scientific basis.

There is no doubt that a great deal of research into materials, stress distribution, preferred shapes, etc is vitally necessary. More important, and probably more interesting, would be an investigation into the design methods used in practice and a correlation of the results obtained with 'exact' calculations and practical tests. Such correlation may well show that in general designers' 'intuitions' are substantially correct.

Most people will probably agree that present design techniques are not really good enough, and are not in keeping with the knowledge that our existence depends almost entirely on the quality of our engineering designs. Engineering failures (in the mechanical sense) it is true, are rare, but this is probably due to over caution on the part of designers and to sound judgment, rather than to exhaustive calculation.

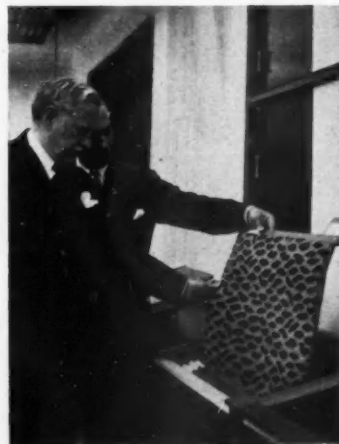
The future will call for much rethinking in engineering design techniques and it is to be hoped that Mr Archer's series of articles will show some of the directions to take.

P. J. BOOKER
Publications Officer
The Institution of Engineering
Designers,
38 Portland Place, London W1

continued on page 55

Design Centre visit

The United States Ambassador, H.E. Winthrop W. Aldrich visited The Design Centre recently. He is seen here examining a carpet sample with W. J. Worboys, chairman of the Council of Industrial Design. The Ambassador felt that the way carpets, textiles and wall-papers were filed for quick reference in 'Design Review' should be of great value for buyers.





Judge's chair in natural mahogany and rich red cowhide. Designed and made for H.M. Ministry of Works for the Court Room, Bahrain, Persian Gulf, by

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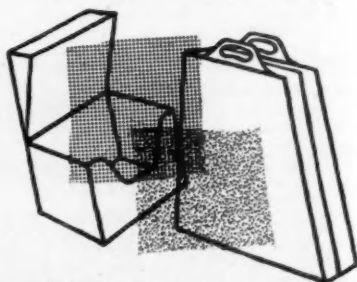
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continued from page 53

SIR: In the article 'Intuition versus Mathematics' by L. Bruce Archer, (DESIGN June pages 12-19) I am quoted as saying "It is only when something breaks and somebody gets hurt that the majority of firms make anything like a thorough design analysis".

This is not a correct quotation of my words, and, especially in the context in the article, it gives a completely erroneous impression of the views I expressed.

In the first place the words in italics were not used by me. In the second place, the whole conversation referred to that form of detailed analysis which is concerned with the exploration of stress concentrations in such features as fillets, notches and holes. My statement should therefore have read - "It is only when something breaks that the majority of firms make a thorough analysis of the design of such features as these".

I am quite sure that all firms making products of any importance do carry out extensive analyses, both theoretical and experimental, of the main features of their designs. They also almost invariably subject the finished product to 'proving' tests under loads much greater than those estimated to occur in service, relying upon these tests to prove the strength of those detailed features whose design has been based upon intuition and experience.

In the great majority of cases such analyses and tests are satisfactory, but unfortunately the 'proving' tests sometimes fail to reveal the weak points of a design, especially in the products subjected to repeated loading that are liable to fail through 'fatigue'. Thus from time to time failures still do occur in service even after stringent proving tests, and hence it is desirable, at least in cases where the consequences of a failure

might be serious, that these detailed stress explorations should be carried out in the design stage of a product.

H. T. JESSOP
Department of Civil and Municipal
Engineering
University College London
WC1

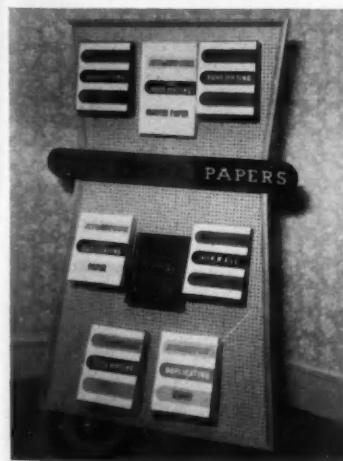
Mr Archer comments:

"I apologise for incorrectly quoting Colonel Jessop's words and I happily accept his revised text. The new quotation together with the last two paragraphs of Colonel Jessop's letter are important statements and serve only to support the view that even in products of "any importance" design analysis is restricted to the main features of the design and is neither as extensive nor as thorough as it could be. Design analysis is even less extensive and less thorough in the field of consumer products. To my mind all products are important to their users and all failures are serious failures if the product ceases to fulfil its function. Who amongst us has not possessed a fountain-pen or a vacuum cleaner or a motor car (or a taxpayer's share in a subsidised aircraft) which has prematurely failed? The whole purpose of my series of articles is to show that it is possible and desirable to make greater use of sound analytical design procedures, and I am sure that Colonel Jessop would be the last person to disagree with that."

Books

Paper display stand

The suppliers of 'Aylestone' papers are confident that sales will increase when their new display stands are released to retailers. The stand can carry a selection of up to nine reams of various types of paper; it consists of a grey peg board plaque, framed in oak. The sign-board is silk screened in black and yellow.



Design: Number 92

What Wood Is That? Dr Alfred Schwankl, translated and edited by H. L. Edlin, Thames & Hudson, 25s

This is a popular guide to the identification of some forty timbers - hardwoods and softwoods; a praiseworthy feature is the provision of a small veneer sample of each. Any such selection is bound to be arbitrary, but to the English reader it may seem odd to find among the specimens of timbers "in common use" plum, willow, robinia and horse chestnut (though not sweet chestnut); and, of all the tropical woods that have come to take so important a place in recent years, only a few are included.

The book is in three parts. Part 1 describes the growth and resulting physical characteristics of timber. It also deals with the causes and effects of shrinkage, warping, etc, and this part, though accurate enough, could have been clarified by more drastic editing. Part 2 develops an ingenious scheme for identifying the chosen woods by means of 12 minutely detailed codes or 'keys', dealing respectively with such features as colour, annual rings, medullary rays, specific gravity, etc, with abundant cross references. It is to be feared that only the stoutest hearted layman will find his way through this earnest but labyrinthine attempt to simplify scientific procedure for his benefit: the others will fall back thankfully upon the samples as a 'crib'.

Part 3 is likely to prove the most useful

section. Here each of the woods is described in full detail, both as a tree and as a timber, with its principal uses.

The translator has wrestled nobly with what must have been a very formidable task; but in a work such as this, which displays all the apparatus of scholarship, it is disturbing to find not only ambiguities but actual inaccuracies. There are two useful indexes and a glossary.

HAMILTON T. SMITH

Sense & Safety, Ministry of Transport and Civil Aviation and the Central Office of Information, HM Stationery Office, 6d

It is well known, but not widely enough realised, that a substantial, and surprisingly constant proportion of all road accidents is caused by a few main types of human error. 'Sense & Safety' sets out to describe and illustrate the most common of these faults. The object of the booklet is admirable, and its message is of vital importance to every road user. Unfortunately its execution is only pedestrian.

The general design is quite 'clean' and avoids vulgarity, but it is not striking. The typography is uninspired and the two colours are not used to best advantage. Some of the illustrations do show clearly where the dangers lie; others are ambiguous, and none has great impact.

There were 267,903 casualties in 1955 (nearly 30,000 more than in 1954, an increase of 12½ per cent). Sound publicity could achieve important accident prevention. Yet road safety publicity continues to be feeble. Funds are far too small, and what money is available is frittered away by 1,200 different local governments* instead of being used effectively by a single, competent authority.

PETER SIEBER

* This subject was discussed in 'Waste on the Roads' (DESIGN August 1955).

An Introduction to Modern Architecture, J. M. Richards, Penguin Books, 2s 6d

This is a revised and up-to-date edition of a classic 'Pelican' book which was first published in 1940.

Designers in this issue

Alvar Aalto (48). Peggy Angus, MSIA, ARCA (25, 30). Eileen Bell (45). J. T. Boardman (36). Antonio Bonet (48). F. E. J. Chinchin (30). Gordon Cullen, FSIA (25). Birger Dahl (47). J. Donnelly (27). Aidron Duckworth, DESCA (42). Charles Eames (48). L. R. Ercolani (34). Pinin Farina, Hon RDI (14, 15). Jorge Ferrari-Hardoy (48). Kenneth Garland (Art Editor). R. Y. Goodden, CBE, RDI, ARIBA, FSIA (53). Lucy Halford (41). Ashley Havinden, OBE, RDI, FSIA, FRSA, FIPA (51). H. R. Hidden (32). Richard Huw, BENG, FSIA (39). ISP Ltd (35). T. B. Jones, MSIA (26-28). H. B. Keith, MSIA (34). Arne Korsmo (47). Juan Kurchan (48). Raymond Loewy, ASID (14, 15). Bruno Mathsson (48). Rolf Middelboe (47). Peter Moro, FRIBA, FSIA (41). Colin Neale (18). R. & R. Nicholson, M/MSIA (25). G. Ormrod (31). C. Hugo Pott (49). A. B. Read, RDI, ARCA, FSIA (25-32). Tibor Reich, FSIA, FRSA (32). Arne Remlov (47). W. A. Roudas (45). Eero Saarinen (48). Reynolds Stone, RDI (53). THM Partners (41). Reginald Till (29, 32). Robin Thomas, MSIA (45). Ward & Austin, F/FSIA (40). Hans Wegner (48). Sarah Wright (44). Marco Zanuso (35).
Designers addresses may be obtained from the Editor.

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